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VOL. XXIX.,

ARCHIVES OF OTOLOGY

EDITED IN ENGLISH AND GERMAN

BY

DR. H. KNAPP
OF NEW YORK

DR. O. KÖRNER
OF ROSTOCK

DR. A. HARTMANN AND DR. U. PRITCHARD
OF BERLIN OF LONDON

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In asking for continued support of the ARCHIVES from subscribers and contributors, the Editors offer no new program, but point to the record of the work that has been accomplished during the past twenty-eight years. At the first appearance of the ARCHIVES in 1869, they constituted the only periodical of their class in America, and had only a few predecessors in Europe. The international character of the ARCHIVES was a novel and distinctive feature.

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For more than ten years, the valuable material offered to the ARCHIVES has been so abundant that it has not been practicable to utilize for the English edition the full series of papers from the German, or the converse. Many articles had to be abridged, while of others abstracts only could be printed. Any one of our readers could, however, have secured, and can secure in future, from the American editors, or the German publisher, the loan of the original papers presenting the complete text.

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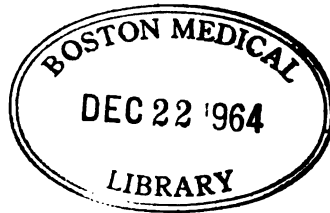
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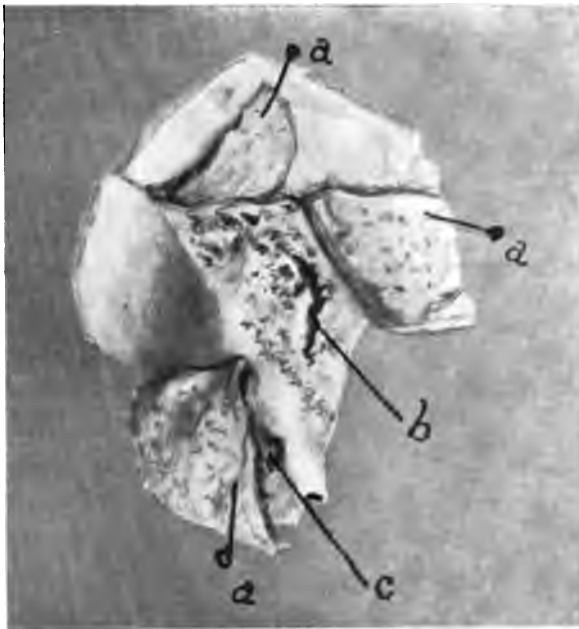


FIG. 3.

CASE VII. Upper internal surface of the temporal bone with the thickened dura mater held back by the pins *a, a, a*. *b* Perforation in the squamous portion. *c* Entrance of the auditory nerves. (From a photograph of the specimen.)

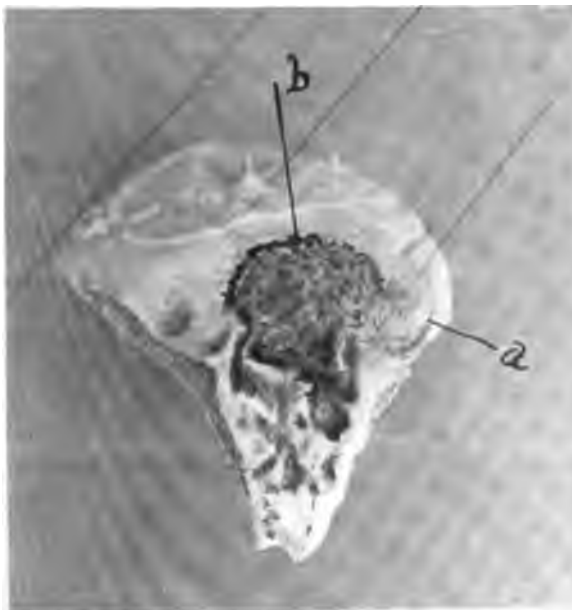


FIG. 4.

CASE VII. Inferior surface of the temporal bone showing destruction of lower wall of meatus and erosion of the bone to near the tip of the petrous portion. *a* The mastoid process. *b* Perforation of the squamous portion passing into the cranial cavity, corresponding to *b* in Fig. 3. (From a photograph of the specimen.)

into the middle ear was good, the acute symptoms were held in abeyance, but all the while the disease was making progress, to manifest itself violently when the drainage closed. In this way we are often deceived as to the age of a morbid process in the mastoid, and may be as to its very existence.

The dizziness complained of on pressure over the swelling may have been due to pressure on the dura, though it is possible that it may have been called up in the usual way by pressure on the contents of the labyrinth. The case also illustrates the tendency of cold applications to mask the symptoms while the process within the mastoid is going forward with perhaps increased activity. The increasing tendency among otologists now is to abandon cold for heat as application at every stage of the disease.

CASE. 2.—Bezold's abscess in a white child of six years. No previous history of ear trouble. Cure.

For the opportunity of seeing this case, I am indebted to Dr. A.R. Shands, who sent the patient, a well nourished and apparently perfectly healthy boy of six years, from the Newsboys' Home, where he had been an inmate for some ten days. The history at that time was, that about a week before his admission to the hospital, on the 7th of June, 1899, a swelling was noted below the ear on the right side of the neck, which gave rise to pain on movements of the head. Otherwise there was no complaint. There was no history of discharge or pain in either of the ears during his short stay in the Home, and, so far as was noticed, there was no defect in hearing. The swelling increasing rather rapidly in size, he was sent to the Emergency Hospital, when the condition was such as is shown in Fig. 1. The imperfectly defined tumor was fluctuating, and reached posteriorly to the edge of the trapezius muscle, anteriorly to the sterno-cleido-mastoideus, and below to near the clavicle. The auricle was not pushed forward nor outward, nor was there any boggiess over the upper mastoid region; no pain on pressure. Movements of the head alone gave rise to discomfort. Temperature only slightly above the normal.

The child was put under the influence of chloroform, and an incision made from the linea temporalis to the tip of the mastoid. The periosteum of the cortex was healthy and on removing it

the bone beneath showed no morbid change. An opening was made with the chisel into the mastoid cavity, which was found to contain some granulation matter, associated with much congestion of the bone. This was carefully removed with a sharp spoon, cleaning out the whole of the space to the tip, where an opening was found, through which, from pressure on the tumor below, pus issued in great quantity. The integument incision was then extended down along the edge of the sterno-cleido-mastoideus, laying bare the abscess cavity. The amount of pus evacuated was more than 3 oz. The soft tissues were found to be very much disorganized. The tip of the mastoid was in a state of necrosis, and in cleaning away the dead bone the occipital artery was severed as it passes in its groove beneath. It was promptly tied with a silk-worm gut ligature. Exploring the abscess cavity farther with the finger, a connection was discovered between this anterior abscess along the sterno-cleido-mastoideus, and another between the trapezius and the splenius muscles. This was opened by a counter puncture from behind and both cavities thoroughly cleaned of disorganized soft tissue. No communication could be established between the mastoid cavity and the middle ear. A perforated rubber drainage tube was introduced through the posterior opening, and passed up through the perforation in the tip, into the mastoid cavity. The primary incision behind the ear and over the sterno-mastoid abscess was closed with a sufficient number of stitches. The child recovered promptly from the anæsthetic, and there was no disturbance of a general character. The wound was irrigated through the tubes with an antiseptic solution every day for a week, during which time only a small quantity of pus came away. The tube was withdrawn at the end of a week, and the opening kept patent with a small teat of iodoform gauze. At the end of ten days more, complete healing had taken place and the parts presented the appearance shown in Fig. 2.

A perforation of the mastoid at its tip—the so-called Bezold's abscess—is very uncommon in infancy, or even in late childhood. Koerner says he has seen only a single case so young as six years. The external plate or cortex of the mastoid is so thin as compared with the cortex in adult life, that the natural tendency is for the pus to break through at any place rather than the comparatively denser tip, that

is, when the middle ear and mastoid cavity are the parts primarily affected. Cases such as this, however, lead us to suspect that there may be instances in which the tip is the seat of the primary lesion. We were not able to establish the fact of the existence of any antecedent affection of the ear whatever. During the child's residence at the Home nothing wrong was noted with the ears, and the grandmother, whom I sent for and questioned closely, affirmed that at no time, at least for the last three or four years, during which time the child had been daily under her observation, was there any complaint of the ears, either in the form of pain or discharge. I know how chary we should be of accepting such negative evidence as in any way conclusive, but the whole history of the case gives color to the opinion that there was a primary disease of the mastoid and especially at its tip. Koerner recognizes the possibility of such a condition, for he says at page 33 of his latest publication, *Die eitrigen Erkrankungen des Schläfenbeins*, "I have the distinct impression, as have also Lemcke, Eulenstein, and others, deduced from clinical experience and the operations performed very early in the disease, that the rapidly progressing necrosis of the interior of the mastoid, as I have seen it after influenza and in diabetics, may begin through a hematogenous infection of the bone first, and later pass over to the pneumatic cavities."

This question will come up again when we are considering some cases farther along in this report.

CASE 3.—Suppuration of the mastoid in a white child of six months, following a discharge from the ear. Mastoid cavity opened and cleaned out. Recovery.

Emily P., a white child of six months, was admitted to the Children's Hospital on June 17, 1899. Father and mother in good health, with no history of tuberculosis or syphilis. Ten days before admission a slight discharge was noticed coming from the left ear; very little pain was complained of. After two days the discharge ceased, and a swelling began behind the ear. The child nourished well and made little or no complaint. It presented the typical picture of post-aural abscesses in children. Large swelling behind and above the auricle, the latter being

pushed forward and outward. The tumor was soft and fluctuating.

Under chloroform an incision was made liberating a large quantity of pus, estimated at one and one half ounces. The soft tissues were much infiltrated and disorganized. The cortex was smooth, but just over the antrum and back of it pus was seen issuing from several dark small points, evidently the defects in the cortex which are sometimes seen at that age, or the perforations through which blood-vessels pass. The wall was very thin and easily broken down under the chisel used as a gouge. The contents of the mastoid, which was larger than I expected in a child of that age, were scraped out with a sharp spoon. They consisted principally of granulation material and bone in a state of beginning necrosis. The cavity was packed with iodoform gauze, and the edges of the wound, after removing the disorganized soft tissue surrounding the abscess, were united with three stitches, leaving drainage below. June 20th : Dressing changed, no pus, no swelling over the mastoid, no abnormal temperature. The dressing was changed every other day for a week, when a simple outward application of aseptic gauze was used. The healing was rapid, with no further discharge of pus from either the wound or ear, and the patient was discharged from the hospital on June 9th, cured, three weeks after the operation.

This represents the simplest form of mastoid infection with which we have to deal—one from which a cure is often effected by a simple Wilde's incision, or even a spontaneous rupture of the post-auricular abscess. According to Koerner, a simple empyema of the antrum may find an outlet posteriorly through the fissura mastoideo-squamosa without leading to a destructive inflammation of the cells of the mastoid cavity. Still in any case that comes under observation it is safer to open the mastoid to get perfect drainage, if for nothing else.

CASE 4.—Suppuration of the mastoid in a white woman of sixty-four years, following grippe. No history of discharge from the ear. Operation five months after the onset of the disease. Exposure of the lateral sinus.

Mrs. F. M., white, aged sixty-four, was taken with the grippe during the latter part of February, 1899, and was in bed for two

weeks. On getting up she had pain in the right ear, but, according to her statement, there was never any discharge. The pain was persistent in spite of poultices and syringing the ear with hot water. About the 1st of July a swelling commenced to form behind the auricle. The swelling gradually enlarged, and this, with the still continuous pain, sent her to my clinic at the Emergency Hospital, where she was admitted to the ward on July 28th. On admission there was marked tenderness behind the auricle, particularly just above the meatus. The post-auricular swelling was considerable, but there was no fluctuation. Hearing for watch 0, and much impaired for voice.

After proper preparation the usual incision was made under ether. The post-auricular artery had to be tied. The periosteum was adherent to the bone. When pushed back and the bone exposed the cortex was found to be intact. An opening was made with the chisels opposite the antrum, and after a depth of $\frac{1}{4}$ inch was reached, pus gushed out. The opening was then enlarged and the mastoid cavity cleared of a mass of granulation tissue and softened bone. The destruction has been specially great posteriorly. When the cavity was finally fully opened to inspection it was found that the descending branch of the lateral sinus was exposed for about $\frac{3}{4}$ of an inch in its length and $\frac{1}{2}$ of its breadth. It looked healthy and the bone surrounding it was clean and white. The destruction was also very great forward and over the meatus. A careful search failed to reveal any opening between the middle ear and the mastoid cavity. The wound behind the auricle was closed in the usual way, the cavity packed with iodoform gauze, with drainage below. The healing in this case was slow owing to the very debilitated condition of the patient. But little pus was found after the dressings, which were renewed every three or four days. At the end of four weeks the healing was perfect and the patient left the hospital.

This would seem to be another one of those cases where the affection of the mastoid was either primary or occurred very early after the onset of the middle-ear disease. This appears to be a characteristic of many cases of grippal origin. Considering the advanced age of the patient, her enfeebled state, and the exposure of the sinus to infection, probably for a long period, it is remarkable that the affection remained local.

CASE 5.—Mastoiditis following grippe in a white woman of seventy-two. Evacuation of the mastoid cavity ; exposure of the descending portion of the lateral sinus.

Mrs. Jane C., a white woman, seventy-two years of age, was brought to my clinic at the Emergency Hospital on August 29, 1899, with the history of having had grippe four months ago, at which time she also had trouble in the right ear. There was a slight discharge from the ear at the beginning, but this soon ceased. The pain, however, continued and was very severe. Three weeks ago she first noted a swelling behind the ear, which has gradually increased. A large fluctuating tumor is now found behind the auricle, pushing it forward and outward. The patient was admitted and, after due preparation, an incision was made into the swelling from the linea temporalis to the tip of the mastoid, giving exit to at least two ounces of pus. In order to get more room for work among the greatly swollen soft tissues, another incision was made at right angles to this, backwards. The mastoid surface was fully exposed. It was found to be denuded of periosteum, and a fistula about 2 *mm* in diameter was discovered just below the mastoid fossa. This was enlarged by chiselling until the whole of cortex, which was very thick, was removed for a space 3 *cm* square. The contents of the cavity were granulation tissue and soft bone. When the cavity was thoroughly cleaned, it was found that the descending portion of the lateral sinus was exposed for at least a half-inch of its length and fully one half its breadth. It appeared healthy, as did the bone around it. No connection could be established between the mastoid and the middle ear. The wound was dressed in the usual way. The temperature fluctuated a good deal, going sometimes as high as 100°, but there was nothing in the condition of the wound to account for it. The general condition of the patient was very bad, and that with her age (seventy-two years) made against her. However, under tonics and stimulants with good nourishment, she was able to leave the hospital at the end of three weeks with the wound entirely healed.

CASE 6.—Extensive destruction, with sequestration, of both temporal bones in a negro girl of four years. Removal of all the diseased bone and posterior wall of the meatus. Recovery.

Lillie Shaw, colored, aged four years, was first seen at my clinic at the Emergency Hospital on June 1, 1899, and ordered to the Children's Hospital for operation. She did not appear there,

however, for admission until June 13th. Both father and mother are living. No other children in the family. No definite history of tuberculosis or syphilis. The child has had none of the exanthemata of childhood and has been generally well except for a discharge from both ears, the beginning of which dates back two years. Its definite cause could not be elicited, but it probably began as an acute otitis media. One year ago a swelling made its appearance behind each ear and broke. The fistulæ have remained open ever since. Recently a piece of bone has been observed protruding from the fistula behind the right ear. Temperature normal. Child does not appear to suffer much.

Under chloroform, after proper preparation, the fistula on the right side was enlarged and a piece of loose bone taken away. It measured 1 cm in length and $\frac{1}{2}$ cm in thickness. It was cancelled, but showed no traces of cochlea or semicircular canals. The cavity was thoroughly scraped and cleared of all granulation tissue and softened bone until hard white bone was reached in every direction. In doing this it was necessary to remove the posterior wall of the meatus completely. As no facial paralysis followed, it is evident that the facial nerve was not implicated either in the original disease or the very extensive curettement that was necessary for the thorough cleansing. The other side was treated in the same manner. It contained no sequestrum, but the destruction of bone was equally great, and in this also the posterior wall of the meatus had to be removed. No facial paralysis on this side either. The integumentary edges of the fistulæ on both sides were trimmed of cicatricial tissue and the wounds completely closed. The cavities were packed and drained from the meatus. The dressings were removed on the 17th, and no pus found; parts dry. The wounds back of the auricles had healed and the stitches were removed. The dressing through the meatus was continued for some ten days. There was then no discharge of any kind and child was sent home. The hearing was of course very much impaired. Some four months later the patient was readmitted for some eye trouble and the condition of the ears was found to be substantially as when she left the hospital.

As I wish to consider specially and collectively the cases of suppuration of the temporal bone as they occur in the negro race, I will add some other histories of such cases before taking up the subject as a whole.

CASE 7.—Long-continued and offensive discharge from left ear of a negro boy of two years. Death from diffuse meningitis. Three tumors found in the brain. Extensive necrosis of the temporal bone. Extradural abscess.

James Dent, colored, aged two years, was admitted to the Children's Hospital on September 1, 1899, with the following meagre history: Father and mother living and in good health. Two other children, both healthy. Child healthy until about a year ago, when he had an earache, followed by discharge. Both ears were affected at first, but the right soon ceased to discharge. The discharge in the left, however, continued and gradually increased both in the quantity and offensiveness of the pus. Up to a few days ago the child seemed to be healthy. It was then noted that it refused to eat and appeared listless and drowsy; and that was the condition on admission. The bowels were constipated. Urine normal. Temperature 102° . The tongue on protrusion was drawn to the right side and there were other evidences of a facial paralysis on the left side. How long that had existed could not be ascertained. When first seen by me on the 4th of September there was a profuse and most offensive discharge of thin pus from the left ear. There was, however, no swelling or sensitiveness over the mastoid. The temperature was ranging from 102° to 103° , and the patient was drowsy, taking notice of nothing. The pupils responded fairly well to light. In view of the conditions as they were afterwards developed, it is much to be regretted that circumstances did not allow of an ophthalmoscopic examination. The right ear presented nothing worthy of note. There being no symptoms of mastoid trouble, and drainage being apparently good, it was decided to watch the case for a day to see if anything would develop giving indications of a focal lesion that would warrant surgical interference.

It looked much like a phlebitis or brain abscess, and yet the symptoms warranting a definite operation were lacking. It was decided to await the developments of the next twenty-four hours. At the end of that time the temperature had somewhat subsided, but the drowsiness continued and there seemed to be a paretic condition of the left arm and leg. On hard pinching there was slight reactionary movement, not so pronounced, however, as on the other side. There was no external evidence of a phlebitis. It was decided to make an exploratory operation, in the hope of finding some indications for further procedure. When, however,

the patient was placed on the table on the morning of the 8th, he was so evidently moribund, with a pulse too rapid to count and a temperature of 104.8° , that it was decided to forego the operation and have an autopsy instead. The child was sent back to the ward, where, at the end of twenty-four hours more, it died, quietly and apparently from exhaustion.

The *autopsy* was made by Dr. W. B. French, in my presence and that of the resident physicians, twenty-four hours after death. Body emaciated, rigor mortis well marked. Abdominal cavity negative, except the retroperitoneal glands, which appeared slightly enlarged. Thoracic cavity: left lung contains a caseated tuberculous mass at the apex, with some old pleuritic adhesions. Heart normal. Cranial cavity: dura adherent to the skull in many places, but apparently not due to inflammation. The pia mater on the convexity was much injected, and there were numerous spots of fibrinous and fibro-purulent exudate on both sides. On lifting the brain from the floor of the skull after severing its connections, the base was found to be studded over with plaques of fibro-purulent exudation, more extensively than on the convexity, and these were particularly abundant about the medulla. They were more numerous on the left side, and varied in size from a pin-head to 4 mm in diameter. Tubercle of the miliary form was not found. There was no general effusion of pus or other liquid. The right side of the base of the skull presented nothing worthy of note. On the left side, however, over the temporal bone, the dura was elevated and appeared much thickened. On the inner surface there were two areas of small dot-like elevations, evidently deposits of fibrine. There was no pus on this surface. Pneumatic pressure through the external meatus lifted the dura from the bone beneath for nearly the whole extent of the internal surface of the temporal bone, but a connection between the two sides of the membrane could not be demonstrated. In fact this was rendered impossible from the great uniform thickening of the dura, which was at least six times that of its normal condition. On incision of the thickened dura, a quantity of pus was found lying beneath, on the surface of the bone, which was rough and in a state of necrosis. The whole of the temporal bone was removed for further examination. On section of the brain on the right side nothing abnormal was found. On the left side, however, three tumors were found in the brain substance: one imbedded in the centre of the

cerebellum, round, with a slightly nodulated surface and about one and a half inches in diameter ; another just above the third ventricle, also round, but smoother, with a diameter of one inch ; the third, still smaller, three quarters of an inch in diameter, in the middle of the frontal lobe, in the corpus callosum, above the septum lucidum. The brain substance around these tumors was very much softened for a distance of one half inch.

One of the tumors was examined microscopically at the Army Medical Museum, and it was reported to be tubercular. This feature of the case will be considered in greater detail in another article.

The temporal bone was examined after thorough cleansing, and its condition is shown in the accompanying figures, made from photographs, Fig. 3 representing the upper and Fig. 4 the under surface of the bone. As will be seen by examining Fig. 4, the lower wall of the meatus was entirely destroyed and the inferior surface of the petrous portion in a condition of necrosis almost to the tip. This necrosis was very marked on the external surface of the squamous portion above the auditory meatus, extending over an area reaching 2 *cm* on all sides. In this area there were points of perforation through the bone into the cranial cavity, and at the upper boundary these perforations, thickly set together, formed an arc of defect in the bone about 2 *cm* in length, as shown at *a* in Figs. 3 and 4. The glenoid cavity was not invaded. From the roof of the tympanum there were numerous small perforations into the cranial cavity, and the substance of the bone was thoroughly honeycombed. On the upper surface of the petrous portion there was much destruction, as shown in Fig. 3. The dura was elevated over the whole extent, except near the tip, and the bone was in a state of extensive necrosis, together with a condition of hyperostosis, the bone on this side being nearly a third larger than on the other. This hypertrophic process is often met with in connection with the destructive inflammations of the bones in negro children, a very pronounced instance of which is to be found in a case of "Double Exophthalmos with Ulcerative Destruction of the Eyes from Sarcoma of the Dura Mater," etc., which I reported and published in the *Trans. Amer. Ophth. Soc.* for 1897. The mastoid cavity was not opened, but there was no reason to suppose from its external surface, which was healthy, that it was involved to any serious extent. The lateral sinus was not implicated. It is evident from

the appearances found after death that no operative procedure, either upon the temporal bone or the brain, would have been of any avail in averting a lethal termination of the process. It is not clear that the presence of the tumors in the brain has any connection with the suppurative inflammation of the bone, though it is noteworthy that all three were found on the left (affected) side.

As pertinent in this connection I will relate the history of another case of extensive necrosis of both temporal bones in a negro child.

CASE 8.—Extensive necrosis of both temporal bones with many sequestra in a negro child. Three operations for relief in three years. Dura mater exposed. Cured.

Cora Burrell, colored, aged three years, was admitted to the Children's Hospital on 21st of December, 1891. Father died of rheumatism. Mother living, in good health. There are other children alive. The child appears fairly well nourished and has no other complaint than a discharge from both ears and from fistulæ behind the auricles, which are said to have existed for a year or more. When crying, the mouth is turned toward the left side. The discharge is very offensive. No definite history of its commencement. On December 31st the child was put under the influence of chloroform, the fistulæ behind the ears enlarged, and all the granulation material and diseased bone scraped out with a sharp spoon, until what seemed healthy bone was reached in all directions. On both sides a defect in the bone exposed the dura mater for more than two centimetres square,—at a point about 4 *cm* backward from the auditory canal. The cavities were packed with iodoform gauze and the wounds closed, leaving drainage at the lowest part. The case progressed well until the 17th of January, 1892, when the child broke out with the chicken-pox. The fistulæ behind the ears never fully healed, and there were frequent outbreaks of discharge. On the 27th of April the patient was again put under the influence of chloroform, the sinuses opened, and more granulation material and diseased bone removed. There were a number of bone sequestra removed from both sides at this time. Most of those were small and contained nothing recognizable as parts of the structure of the labyrinth. In the midst of the operation the child's breathing and pulse stopped for more than a minute. It was resuscitated by holding it

up by its feet, together with injections of nitro-glycerine. On recovery, the operation was continued to completion. After this second apparently thorough curettement the discharge from ears and fistulæ ceased for a time. On the 20th of June diphtheria developed. On convalescence from this the discharge from both fistulæ again set in with renewed vigor. It was, however, not brought back to the hospital until January, 1894, just three years after the first operation, for another effort to eradicate the disease. The child during all this period had been given tonics and the

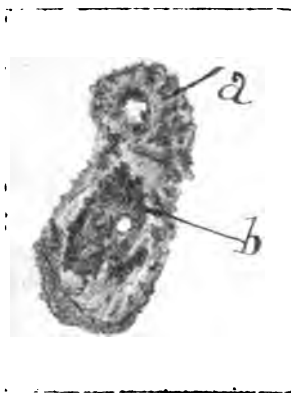


FIG. 5.

A sequestrum from Case 8, showing what is presumed to be the remnants of the vestibule (*b*), and a semicircular canal (*a*) $\frac{1}{2}$ larger than natural.

nutrition attended to as well as possible. On the 24th of that month it was again placed on the operating table, the parts behind the ears freely opened up, and all the diseased tissue that could be discovered removed. Again the respiration and pulse ceased during the operation, but the same methods employed before brought about resuscitation. At this time a considerable number of small sequestra were removed, and on the left side one large one, 2 cm long and 1 cm thick, which evidently came from the petrous portion. The individual parts could not all be identified, but the general appearance was that of the vestibule with at least one semicircular canal (Fig. 5). From the amount of material removed at these three several operations it hardly seemed possible that any of the temporal bone, particularly of the petrous portion, remained. The facial, on the left side, had long ago succumbed to the destructive process; in some mysterious

manner it escaped on the right side. At no period during the long continuance of the disease did the child seem to suffer from vertigo or from anything that could be referred to affection of the semicircular canals. This last endeavor seemed to be crowned with success, for the patient left the hospital on the 7th of March, 1894, with no discharge. There seemed to be some little hearing power left.

The case whose history follows I did not see during life, for the reason that there were no aural symptoms of sufficient gravity to have my attention called to them. It was only in the dead-house that the temporal-bone disease was revealed.

CASE 9.—*Meningitis in a negro child of four years, with no symptoms during life of any aural disease. Extensive necrosis of the mastoid and temporal bone with extradural abscess found on autopsy.*

Sarah West, colored, aged four, was admitted to the Children's Hospital on January 20, 1899. Father and mother both living and in good health, as are likewise their three other children. Has never been ill before. Was taken suddenly this morning with vomiting and pain in the abdomen. On admission there was anorexia and pain in the frontal region; child irritable and restless, tossing from one side of the bed to the other; eyes kept half closed; pupils rather larger than normal; brows and muscles of the upper part of the face contracted; much muscular soreness complained of. Lungs and heart and urine normal. Temperature 103° ; pulse 104. During the night the temperature ran up to 104° ; patient restless and delirious at times. Put on milk diet, and sod. brom. ordered. January 20th: Temperature irregular, ranging from 99° to 102° ; delirious at night; slight retraction of head. There is a painful area over each of the mastoid processes, but no swelling. 24th: Temperature irregular, restless, and cries out and objects to being moved. 26th: Quieter, temperature coming down, sleeps better; takes and retains nourishment. 28th: Generally better; a few fine crackles and râles heard over the inframammary region on right side, and slight dullness on percussion there. Pneumonia jacket applied. 30th: Temperature up again; somewhat restless. February 1st: Did not sleep so well and had an attack of screaming; subsultus tendinum. 5th: Temperature 102° to 104° . 7th: Getting weaker,

otherwise the same. 9th : Very restless and nervous. At 9 P.M. a slight convulsion ; temperature 100° to 102° . 13th : respiration slow and irregular, pupils dilated, pulse slow and irregular ; purulent discharge from nose. 15th : Respirations irregular, is somnolent, and has muscular twitchings. 18th : Gradually declining, will not take nourishment, pulse rapid and irregular, respiration slow and irregular with frequent sighings. 22d : Been growing weaker since last report. Died at 10 P.M.

Post-mortem made eighteen hours after death. Body much emaciated. Liver, spleen, and kidney somewhat congested. No ulcers in intestines ; retroperitoneal and mesenteric glands somewhat enlarged. Lungs congested, with slight pleuritic adhesions on both sides ; no tubercular deposits or solidification. Heart and vessels normal. Cranial cavity : meninges and brain vessels full of blood. On the convexity there were many plaques of fibro-purulent exudation, and a large amount of yellow fluid was found at the base. On the base of the brain there were many fibro-purulent exudations, particularly at the pons, medulla, and base of the cerebellum. On the left side the petrous portion of the temporal bone and the mastoid cells were necrosed, in a honey-combed condition, and filled with pus. Under the dura mater at this place there was a large accumulation of pus, but no communication could be established between this and the brain.

CASE 10.—Mastoiditis in a negro child of fifteen months, following a discharge from the ear. Mastoid opened and cleaned out. Cured.

Winnie Graves, colored, aged fifteen months, was admitted to the clinic at the Emergency Hospital, on September 12, 1899, with the history that four weeks before the mother had first noted a discharge from the right ear, unaccompanied, however, by pain or any complaint on the part of the child. A week ago a swelling was noticed behind the ear, which has gradually increased in size. Temperature on admission, 97° . A large fluctuating tumor was found behind and above the right ear, pushing the auricle outward and forward. There was a slight discharge from the external ear. After proper preparation the usual incision was made from the linea temporalis to the mastoid tip, giving exit to about an ounce of pus. Soft parts were much thickened and the

connective tissue disorganized. The mastoid was denuded of periosteum, and near the fossula mastoidea a dark spot was discovered, gentle pressure on which with a probe gave issue to a quantity of pus. This opening was enlarged with a hand chisel and the contents of the mastoid cavity, consisting of granulation material and soft red bone, removed with a sharp spoon. The antrum was carefully cleaned, and water injected into the external auditory canal came out at the mastoid opening, one syringeful bringing with it the incus, which was found upon examination to be healthy. No other ossicle was thus removed. The case was dressed as usual, with packing of iodoform gauze, with drainage at the most dependent part. The case progressed well, with the slight fluctuations in temperature common in children. It left the hospital at the end of a week, returning for redressing at the out-door department. In two weeks the wound behind the ear had healed, but there was still some discharge from the ear. Under antiseptic syringing this ceased in ten days more.

I have grouped together these cases among negro children for the purpose of offering some comments on *diseases of the temporal bone in the negro*. Many years ago I reported upon the relative frequency of ear diseases in the white and colored races in the United States (ARCHIVES OF OTOTOLOGY, vol. xvi., No 4, 1887), and I there stated that in my experience the affection of the middle ear, known as sclerosis or dry catarrh, was much less common among the negroes than among the whites. This referred particularly to the adult. Furthermore, my added experience has shown me that suppurative diseases of the temporal bone are also very uncommon among negro adults. *I have never seen a case of mastoiditis in an adult negro.*¹ This is by no means the case, however, with the negro in infancy and childhood. Negro children are very subject to diseases of the bones, particularly in the form usually called "tubercular." The records

¹ In a discussion of this paper when it was read before the Medical Society of the District of Columbia, in December, 1899, only one surgeon practising otology reported that he had ever seen a case of mastoid disease in the adult negro. I have made further inquiry among the otologists of Washington on this point, and there seems to be a unanimous opinion as to the great rarity of the disease in the adults of that race. My own experience covers a period of more than twenty years, in a clinic composed two-thirds of the colored race, and several other hospitals in which negroes are treated.

of the Children's Hospital, in this city, show this abundantly. Not only this, but suppurative disease of the bones when once established is very difficult to eradicate, and relapses are frequent. The negro child is, almost without exception, badly nourished, and nearly always "scrofulous." It would not perhaps be safe to say that in every case this means tuberculosis in a demonstrable form in some organ, though few autopsies show its absence, but the power of resistance is much reduced and recuperation sluggish. Whether all cases of temporal-bone suppuration in these children start in middle-ear inflammation is doubtful in the face of the history of Case 9, where there was no evidence or previous history of an ear trouble of any kind, except a slight tenderness over both mastoids in an extremely hypersensitive patient. There seems at any rate to be a strong predisposition among them to take on suppurative disease in these bones on slight provocation, and, it is possible, idiopathically.

EXCESSIVE HEMORRHAGE, FOLLOWING THE REMOVAL OF A MYXO-FIBROMA FROM EAR.

BY CLARENCE R. DUFOUR, PHAR.D., M.D., WASHINGTON, D. C.

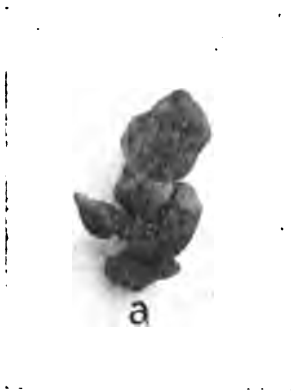
(With a figure in the text.)

Mrs. B., aged about fifty years, married, the mother of several children, consulted me in regard to her ear. She said that it was very sore and painful and that something was growing out of it. She gave a history of suppurative otitis media of many years' standing. Upon examination I found the external canal completely filled by a polyp which protruded from it. There was an abscess on and around the tragus which was so painful that the ear could not be handled even in the gentlest manner. I advised an operation for the removal of the polyp, to which she consented, and which she wanted performed at her home.

The following day, with the aid of an assistant, I proceeded to remove it by means of the snare. Though very painful on account of the abscess, I succeeded in getting the wire well down on the growth. It was a matter entirely of touch in doing so, for the canal was so occluded that no part of it or the polyp could be seen below the external meatus. Upon attempting to cut through it I found it could not be done, so I removed it by torsion; it came away in its entirety and was followed by a severe arterial hemorrhage; the blood welled up and overflowed the canal. I used hot water to check it, but it had no effect. I found that by compressing the carotid artery in the neck the hemorrhage would entirely cease. I made pressure in this manner for some time, but as soon as it was removed the hemorrhage returned. I packed the canal as well I as could with absorbent cotton; the intense pain

of the abscess caused her to resist any treatment directed to the ear. The blood soon found its way through the cotton and flowed out of the canal. The family began to be alarmed, and it looked as if the carotid artery would have to be tied in the neck. I assured them that the hemorrhage could be stopped in that manner, but before resorting to it I would put the patient under chloroform and pack the ear firmly with gauze. To this she consented, so under the effects of the anæsthetic I packed as firmly as I could the entire canal with iodoform gauze, using several pieces. This stopped the hemorrhage. In four days I removed the gauze and there was no return of the hemorrhage.

The growth proved to be a myxo-fibroma with attachment (a) in the middle ear.



My theory of the cause of the hemorrhage is that the growth involved the small branch of the internal carotid artery which is distributed to the floor of the middle ear, that the walls of the artery partook of the fibrous character of the growth, and when the latter was removed the walls of the vessels gaped instead of closing. The pressure from the growth being removed, the abscess on the tragus soon healed. The discharge from the ear ceased under about two weeks' treatment. For a short time I used antiseptic washes, then as the discharge diminished I changed to the dry treatment. When last seen the patient was entirely free from the discharge from the ear.

FACIAL PARALYSIS AS A COMPLICATION OF ACUTE OTITIS MEDIA.

By WILLIAM R. MURRAY, PH.B., M.D., MINNEAPOLIS, MINN.

THE following cases are cited as showing that out of 258 cases of acute otitis media, presenting themselves at the Illinois Eye and Ear Infirmary, during the year of the writer's service as resident surgeon, the above complication was present in two of the cases.

CASE 1.—Patient, H. W., male, æt. thirty-four, occupation soap-maker. Family and personal history good, previous general health good.

Patient entered the hospital February 10, 1898, with the following history : Four days previously he had received a kick on the left ear, followed by acute pain, which persisted until rupture of the drumhead occurred, paralysis of the corresponding side of the face occurring at that time. On examination there was found rupture of the left memb. tympani with slight purulent discharge from the middle ear, and paralysis of the peripheral branches of the seventh nerve, angle of mouth drawn markedly towards the opposite side, left cheek flaccid, patient unable to protrude the tongue in the median line, unable to close left eyelids. Patient put on tonic treatment, iron, quinine, and strychnine, antiseptic treatment of the middle ear, and faradism to the paralyzed muscles. Treatment was followed by rapid improvement, discharge from ear ceased in a few days, and at the end of six weeks there was a disappearance of all signs of facial paralysis.

CASE 2.—Patient, G. C., male, æt. fourteen, schoolboy, entered the hospital February 25, 1898, with the following history : Three

weeks previously the patient had had a severe attack of earache in left ear, accompanied, shortly after the onset of the attack, by a facial paralysis of left side. This was followed by rupture of the drumhead and discharge from the left ear. Three weeks later he appeared at the hospital, and on examination there was found an acute purulent otitis media, with slight discharge from the middle ear, and a partial paralysis of the facial muscles supplied by the seventh nerve on the left side. Patient put upon the usual antiseptic and tonic treatment, with application of the electric current to the paralyzed muscles. This was followed by cessation of the discharge, restoration of the drumhead, and disappearance of the facial paralysis.

LAKE, R. (*J. Laryng., Rhin., and Otol.*, London, 1895, vol. ix., p. 337), in his article on "Facial Paralysis in Recent Otitis Media," reports 4 cases of facial paralysis out of a series of 658 cases of purulent otitis media.

BUCK (*Manual of Diseases of the Ear*, 1895, p. 31) states that the lesion is usually in the Fallopian canal just above the oval window, the bony canal being often imperfect at this point, and when it occurs in the course of an acute otitis media the nerve probably stands in an abnormally close relationship to the tympanic mucous membrane, or the surrounding shell of bone may be defective at some point.

POLITZER, A. (*Diseases of the Ear*, p. 450), gives the results of facial paralysis as: 1. Complete recovery in those cases in which the inflammation, which has extended to the facial nerve, is fully resolved. 2. Persistent paralysis of the whole nerve, or of some of its branches, when by thickening and retraction of the neurilemma, the conducting power of the nerve is impaired, or when the individual nerve bundles have their function destroyed by ulceration, induration, or fatty degeneration.

Tracing the course of the facial nerve, from its deep origin in the floor of the fourth ventricle, it passes forward and outward on the middle peduncle of the cerebellum, and enters the internal auditory canal, thence passes through the aquæductus Fallopii, and emerges at the stylo-mastoid foramen, just beneath the lobe of the ear, and supplies most of the muscles of the face.

During its passage through the Fallopian canal the anatomical position of the nerve accounts for the somewhat unusual complication of facial paralysis attending an otitis media, and, when present in an acute catarrhal case, is due to the direct extension of the inflammatory process to the nerve sheath, which, lying within the unyielding bony walls of the Fallopian canal, may be subjected to sufficient pressure, from the swelling attending a slight inflammation of the nerve sheath, to interfere, partly or completely, with the functions of the nerve, and is probably due to some abnormality of the bony structure surrounding the nerve, probably in the neighborhood of the fenestra ovalis, in the internal wall of the tympanum, where the canal turns from its horizontal course, and passes downwards to its exit at the stylo-mastoid foramen.

THE RINNÉ AND GELLÉ TESTS.

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Translated and Abridged from Band xxxii., S. 44, 1898, by Dr. J. GUTTMAN.

I.—THE RINNÉ TEST.

AS a result of his observations, Rinné concluded that normally the sound of a tuning-fork held in front of the ear can be heard distinctly even after it can no longer be heard when placed on the upper incisor teeth. This phenomenon (positive Rinné), he asserts, is also to be observed in cases of nervous deafness. But, on the other hand, in case of impairment in the sound-conducting apparatus, the sound of the tuning-fork placed on the cranial bones can be heard just as long as, or even longer than, by air-conduction (negative Rinné).

Numerous experimenters confirm or deny the utility of the Rinné test. Whereas Burkhardt-Merian finds the Rinné test of no value, inasmuch as he found Rinné positive in 29 per cent. of stapes ankylosis, Politzer regards the test as of great assistance in diagnosis, although the results may differ when testing with two different tuning-forks, with forks with or without clamps at the upper ends; the test may be positive even in cases of unquestionable peripheric affections. Brunner invariably diagnoses disease of the sound-conducting apparatus when he finds Rinné negative. Schwabach found the test positive in 43 per cent. of cases of disease of the sound-conducting apparatus, and therefore regards the test as worthless if we obtain different results with two

tuning-forks. According to Rohrer's statistics, Rinné is positive in 40 per cent. of labyrinth affections; negative in 63.3 per cent. of severe middle-ear disease. Eitelberg attaches little importance to the Rinné test alone. Barr also found Rinné negative in 63 per cent. of disease of the sound-conducting apparatus. Gruber and Urbantschitsch regard the Rinné test as non-conclusive, and Urbantschitsch believes that the result of the test depends upon where the tuning-fork is placed, and that contrary results are obtained at different times. Bürkner advises the controlling of the Rinné test by reversing the procedure, by placing the tuning-fork on the mastoid process when it can no longer be heard in front of the ear, and if the results of the experiments agree, he considers the test of diagnostic value. In opposition to Gradenigo, who considers the Rinné test of unquestionable diagnostic value, Jacobson denies the value of tuning-fork tests in general, with the exception of good perception of the low notes and poor perception of the high notes in affections of the labyrinth and the symptom of incorrect hearing.

According to Steinbrügge the prolongation of bone-conduction is due to a hyperæsthesia of the auditory nerve.

A decided advance in the matter of the Rinné test was brought about by the investigation of Bezold. The measurement of the time in seconds, with which the air-conduction exceeds the bone-conduction, or *vice versa*, and above all the performance of the Rinné test not with one tuning-fork alone, but with several forks, especially with low notes, are of the greatest importance. According to Bezold, the positive Rinné is more reliable the lower we descend in the scale, and similarly the negative also approaches the extreme — θ (the tone is only heard from the bone) as we test with increasing lower notes. The greater the impairment of the sound-conduction the more decided is the negative Rinné—*i. e.*, air-conduction for the deeper notes is entirely lacking in these cases and for the higher notes the bone-conduction is even greater.

All examinations that are made without a due consideration of the results of Bezold's observations are valueless, and all records in which the Rinné test was made with only one

tuning-fork are of no service in deciding the diagnostic value of the Rinné test. The examination of a slightly deaf person with the fork c^3 may give us a positive Rinné, whereas examination with c^1 may give a negative Rinné, and with C or C^1 an absolutely negative Rinné. The expression "negative or positive Rinné" is therefore of no value unless accompanied with the statement of the fork used in the examination.

The dependence of the result of the Rinné test on the form, the location of the application, and the concussion of the tuning-fork does not here come into consideration.

While the result of the Rinné test is always the same when it is found positive for the lowest tones, for in this case it is positive for the higher tones also, it may vary when Rinné's test is found negative for some tones of the scale. The test with one tuning-fork of a lower octave may show a preponderance of bone-conduction, a tuning-fork of a still lower tone may show the entire absence of air-conduction, while the test with a higher octave may show the preponderance of air-conduction.

The different phases of the Rinné test may be summed up as follows :

1. Positive Rinné, *i. e.*, Rinné is positive for the deepest tones and hence for all tones.

2. Negative Rinné. (a) Total negative Rinné, *i. e.*, Rinné is negative for all tones that can be tested (to c^3 inclusive).

(b) Partial negative Rinné, *i. e.*, Rinné is positive for the higher notes and negative only for the low notes (Rinné partly negative to c^1 , *i. e.*, Rinné is negative for all tuning-forks to c^1 exclusively).

(c) Absolute negative Rinné, *i. e.*, for the lowest notes the air-conduction is entirely absent (—), yet Rinné may be wholly or partly negative,

Whereas in the well-known procedures which effect a change of pressure in the middle ear, as closure of the auditory meatus with the finger, Valsalva's experiment, aspiration test, the Rinné test remains positive, it becomes partly negative in the following experiment :

Experiment I.

With a hand bulb we compress the air in the external auditory canal of a person having normal hearing power, and perform the Rinné test during this compression by placing the tuning-fork on the mastoid process, and when the sound has ceased we place the fork on the tube leading to the ear. We find then that Rinné becomes negative for A' and C, whereas it remains positive for c, and that with the cessation of the compression Rinné again becomes positive for A' and C.

That the order of the procedure in this test is not the cause of the result obtained is shown by the fact that the air- and bone-conduction remain normal when the bulb is not compressed. Just as we succeed in producing experimentally through a slight influence on the middle ear a negative Rinné, so we find clinically Rinné only partially negative, for the deeper notes only, in cases in which, judging from the slight impairment of hearing, we presume that there is but a mild affection of the sound-conducting apparatus. On the other hand, in the worst forms of deafness not following secretory disease of the middle ear, as is shown in stapes ankylosis, we find Rinné mostly absolutely and totally negative. The Rinné test may therefore be useful not only for the diagnosis of middle-ear affections but also to enable us to estimate the severity of the disease.

The result of the Rinné test is often modified by the fact that in addition to the middle-ear disease there exists an affection of the auditory nerve-apparatus.

II.—GELLÉ'S TEST.

It is of practical importance to possess different modes of diagnosis by which the result of any test may be verified and completed. Were all ear diseases located in the middle ear or in the labyrinth, one method of examination would enable us to make a diagnosis. But considering the various combinations of pathologic conditions encountered in ear disease, it becomes necessary to avail ourselves of the Weber test, and of Schwabach's test, the examination of the perception of the higher notes. By far the most valuable

aid to the completion of the Rinné test we must consider the test of centripetal pressure, as recommended by Gellé, for the results of these two tests very often agree.

Although Gellé, as early as 1881, devised a method for the determination of the mobility of the stapes in the foramen ovale, nevertheless this easily accomplished test is not yet commonly employed. His test is as follows: A sounding tuning-fork is placed on one of the cranial bones while the air in the external auditory canal is compressed with a hand bulb. If the intensity of the sound becomes diminished, the stapes is movable (positive Gellé); but if the sound is unchanged, the stapes is immobile (negative Gellé). Rohrer was the first to appreciate the value of the Gellé test and to utilize it. He regarded it of service in differentiating primary and secondary affections of the labyrinth, and also utilized it for the purpose of controlling the Rinné test. He found Rinné positive in 92 % of cases where Gellé was positive, and negative in 45 % where Gellé was negative. The tuning-fork used by him was \bar{c} (512 d. v.). Gruber simply mentions the test in his text-book. Bezold regards the result as due to the mode of procedure, which he does not regard of any value either for diagnosis or for the theory of expansion for the explanation of the improved bone-conduction in anomalies of the sound-conducting apparatus. It cannot be understood why Bezold does not regard the Gellé test as a test for the air-conduction, inasmuch as the sound of the tuning-fork placed on the hand bulb can be heard only so long as the tube, which leads to the ear, remains open.

Hartman considers the Gellé test as an extension of Weber's test, and like Bürkner denies any diagnostic value to it, especially after the researches of Politzer and Bezold. The most complete work on the method of the centripetal pressure comes from Bloch; he contradicts Bezold's objections, and on the strength of his researches arrives at the conclusion that the positive Gellé which is normally obtained is due to the impairment of the mobility of the sound-conducting apparatus caused by the compression; with a movable tympanic membrane the negative result indicates a

fixation of the stapes. Urged by Rohrer, Argentowsky compiles the results of Rinne's and Gellé's tests. By positive Rinne he found Gellé positive in 58.9 %; by negative Rinne he found Gellé negative in 77.9 %; similarly to Gellé and Bloch he also considers the negative result of the centripetal pressure, when the tympanic membrane is movable, as due to immobility of the stapes.

Gellé, Jr., worked up the experiments of his father in his dissertation. We are interested only in his appeal that we control the Rinne test only by the Gellé test. According to him, a negative Gellé with a negative Rinne indicates an immobility of the stapes, whereas a positive Gellé indicates that the stapes is still mobile; with a positive Rinne a negative Gellé indicates a fixation of the stapes in addition to an affection of the labyrinth. The examinations were made with the tuning-fork at I (=C). Panse refers to these tests in his recent paper, but does not express an opinion as to the value of these researches. In Bezold's latest publication on *The Functional Examination of the Human Hearing Apparatus*, we find nothing about Gellé's test beyond a mention of Bloch's researches.

Although we do not wish to enter into any physiological discussion, we wish to make some remarks concerning Gellé's test.

According to the researches of Politzer, Lucae, and Bezold, the entire sound-conducting chain moves inward from the tympanic membrane towards the stapes as a result of a positive pressure produced in the external ear. If the sound of a tuning-fork is transmitted through a bone of a section of the auditory apparatus, from which the tegmen tympani has been broken away, and if by means of a lever placed on the head of the hammer a waving curve be described, we note that the amplitude of the curve becomes smaller in proportion to the increase of pressure.

It is obvious that a sound transmitted through a bony path diminishes in its intensity if any part of this path suffers some impairment in its capacity of wave transmission, as is the case when the air is compressed in the outer ear. But if the mobility of the sound-conducting chain is modified by

fixation or ankylosis of the stapes in the oval window, the impaired wave transmission produced externally by the compression is without any influence on the intensity of the sound of the tuning-fork transmitted through the bone, so that it is heard undiminished.

The following experiment will serve to show how a modification in the mobility of the sound-conducting chain is produced in the normal ear by compression from without and by fixation of the stapes.

Experiment II.

The tegmen tympani of a human auditory apparatus is broken away, the vestibule is exposed in such a manner that the stapes lies free, and a glass thread, 8 *cm* long, is attached to the hammer. If an angular measure is attached to the bone so that the thread may be placed at the point marked 90° , the oscillations of the head of the hammer may be read off in degrees. By means of a Politzer bag into which a hole has been burned we produce a pressure of 5–10 *mm* Hg., measured by a manometer, as it is employed in the Gellé test for the purpose of diminishing the intensity of the sound.

The angle formed by the thread during the compression is 5° ; after the cessation of the compression 15° . If now the stapes be fixed behind by means of sealing wax in the oval fenestra, the mobility of the thread is diminished about $\frac{1}{2}$ during the compression. If the hole in the Politzer bag be left open during the compression, no motion is manifest.

The following experiment of Bloch demonstrates that the cause of the diminution in the sound of the tuning-fork in Gellé's test is due to the impaired mobility of the sound-conducting apparatus and not to a change in the labyrinth pressure, as was believed by Gellé.

Experiment III.

If the normal ear of a living human being is kept under a higher pressure (to 25 *mm* Hg.) for some time by means of compression in the outer ear, no signs of increased pressure in the labyrinth—as dizziness, subjective noises—appear. From this we conclude that the fluid in the labyrinth

which was displaced by the inward movement of the stapes must find its immediate outlet into the aqueduct, so that the increased pressure in the labyrinth produced by the compression is immediately compensated. If the change in the labyrinth pressure were the cause of the diminution in the intensity of the sound of the tuning-fork, transmitted from without through the bony path, then an increase in the intensity of the sounds would have to be observed after the decrease of the sound in the beginning of the compression which results from a compression of longer duration and a proportional sound transmission, for from Experiment III. we see that a compensation in the labyrinth pressure takes place immediately.

Experiment IV.

The handle of an electric tuning-fork c (128 d. v.) is connected with the teeth of the upper maxilla by means of a piece of wood; as often as a compression (10 mm Hg.) is produced in the external canal, the intensity of the sound becomes diminished. If the pressure is kept up continuously (two minutes), the diminution in the sound can be observed only at the beginning; during which time the sound remains equally weak both for myself and a colleague, and increases only after the compression ceases.

There can therefore be no doubt that the centripetal pressure in cases of mobile drum can give no information concerning the mobility or immobility of the stapes; this confirms the value of this test.

It is evident that the test furnishes no information concerning the anatomical type of the fixation of the stapes; we must have other means of ascertaining this. Successful inflations of the middle ear will indicate that we are not dealing with a stapes ankylosis, and if Gellé's test becomes positive during our treatment, it will indicate that the fixation of the stapes was not absolute and indissoluble. All in all we may regard the Gellé test as a means by which we can learn the condition of one of the most important parts of the sound-conducting apparatus, the fenestra ovalis.

III.—THE RINNÉ AND GELLÉ TESTS.

From exact functional examinations of a great number of patients in our clinic who were afflicted with a high degree of deafness, most of them in both ears, whose tympanic membranes showed a more or less negative picture,—which consequently furnished no information as to the nature of the auditory affection,—and in whom the employment of Politzerization through normally patent Eustachian tubes caused no improvement, we concluded that the Rinné and Gellé tests show a certain regularity in their result. With Gellé's test and Bezold's method of performing the Rinné test, we are enabled to ascertain the primary and most important seat of the pathological changes, even in difficult cases of differential diagnosis, with as great a precision as is possible without the control of a post-mortem.

If we make the Rinné examinations, as we invariably do in our clinic, with A', C, c, c', c'', and the Gellé test with the d' tuning-fork according to Bloch's precautions, we get the following results:

1. If Rinné is positive for A',—and hence also for all higher notes on the scale,—it is also positive for Gellé.

2. If Rinné is negative for A' or ± 0 , but for C ± 0 or positive (hence Rinné partly negative to C), Gellé is positive.

3. If Rinné is totally negative (and then usually also absolutely), *i. e.*, A'— \emptyset and c' still negative, or if Rinné is — \emptyset for A' and for c' still negative, but positive for c'' (hence Rinné absolutely and partially negative to c''), then Gellé is negative.

4. If Rinné is — \emptyset for A' or negative, and for c also negative, but for c' positive (hence partially negative to c'), then Gellé is usually negative.

5. If Rinné is — \emptyset for A' or negative, but for c ± 0 , or positive (hence partially negative to c), then Gellé is positive or negative.

That the Gellé test remains positive in cases in which the Rinné test is negative for low notes, finds its explanation in the fact that Rinné becomes partly negative (*i. e.*, for the

lowest notes) in cases of slight affection of the sound-conducting apparatus with only slight impairment of the hearing power. The Gellé test (which in case of a movable *membrana tympani* tells us only whether the stapes is movable or not) remains positive in spite of the fact that a pathologic condition exists in the middle ear; it becomes negative only when the stapes is ankylosed; if this stapes ankylosis cannot be gotten rid of by our therapeutic measures, *e. g.*, the air douche, etc., it remains constantly negative, just as the Rinne test constantly remains absolutely and almost totally negative in these cases of stapes ankylosis.

Summing up the conclusions of our observations once more we arrive at the following important diagnostic facts:

1. If the Rinne test is positive, then Gellé is also unexceptionally positive, and the impaired hearing is due to nervous affections.
2. If the Rinne test is negative absolutely and totally or up to c' , the Gellé test is unexceptionally negative, and the impaired hearing is due to a stapes ankylosis.
3. If the Rinne test is negative below or up to the c limit, and positive above it, then the Gellé test decides whether a stapes ankylosis exists or not.

A METHOD FOR THE FUNCTIONAL EXAMINATION OF DISEASED EARS.

BY PROFESSOR FR. BEZOLD, MUNICH.

Translated from the Germ. Ed., Vol. XXXIII., S. 165, 1898, by Dr. ARNOLD H. KNAPP, New York.

A PRESENTATION OF THE VARIOUS METHODS FOR TESTING THE HEARING FUNCTION OF THE NORMAL AND OF THE DISEASED EAR.

I.

IN addition to the examination with the whispering and the conversational voice, we require a continuous scale of pure sounds free from overtones, of which every single tone is loud enough to permit the diagnosis of deafness through its non-perception, in order to obtain a general estimate of the complete hearing power of an auditory organ.

Edelmann has made a continuous tone series, under my directions, which answers for testing the lower six octaves of the tone scale from C_2 - c^{iii} , by means of clamped tuning-forks with movable weights, two organ pipes, and a Galton whistle modified by himself for the adjoining upper part of the scale to the highest hearing limit.

A tuning-fork with clamps registering down to eleven double vibrations is added to determine the physiological lowest limit. This very complete fork can be spared in the examination of affected ears.

The normal upper hearing limit is contained in the range of the Galton whistle. According to C. Stumpf and M. Meyer, who have experimented with Edelmann's modified Galton whistle and other sources of sounds for the upper

part of the scale, the Galton whistle gives the highest tones in the scale of all the more usual methods of examination, though tones over twenty thousand vibrations can no longer be located in the scale with accuracy.

The continuous tone series is only employed to prove total defects for any part of the tone scale and this only by air-conduction. Thus in the moderately deaf in each case requiring a more exact functional examination, the lower- and the upper-tone limits are determined; while in those who are very deaf, completely deaf for speech, and deaf-mutes, first the determination of the contraction at the upper and lower ends is made and then all defects and islands occurring within the range of the tone scale are out.

Partial defects, *i. e.*, shortening of the hearing for separate tones in the various parts of the scale, require for the more exact graduated determination of the shortening, sources of sound which die out very slowly. The pipes cannot be used for this purpose, and in the lower part of the scale where the forks are clamped it is better to have sound sources which die out as slowly and unimpededly as possible. Hence, unclamped forks are the most suitable to test the duration of hearing.

The examination for partial defects in the range of the scale is more tedious than to find total defects at various places, and it is sufficient to record the hearing duration throughout the scale from interval to interval in fifths or octaves which Lucae, Dennert, Hartmann, and others have done.

With a view of doing without another series of unclamped tuning-forks for testing the hearing duration for air-conduction, Edelmann has so arranged the succession of the clamped forks that with weights removed they follow one another in the intervals C, G, c, g, etc. Furthermore, to enable the examination of the upper part of the scale for its duration, a portion which has a practical significance, the tone series was continued upward in equal intervals by means of unclamped forks to the height of c^v inclusive, which sound as intensely and cease as slowly as the excellent tuning-forks c^{iv} and f sharp^{iv} of Lucae.

The tone series consequently embraces all octaves from C-c^v and also from G-g^{iv} in unclamped forks and allows the estimation of the hearing duration in fifths, fourths, or in octaves, according to the demands of each case.

This series of unclamped forks can also be employed to test bone-conduction from the vertex or the mastoid process and as well for the comparison of the air- and bone-conduction (Rinne test). I have, however, found that the unclamped forks A and aⁱ are more serviceable for the latter experiment.

A supplementary fork between these two may be employed, though A and aⁱ usually suffice. In the areas of the tone series below A and above aⁱ, the examination of bone-conduction and for the Rinne test loses in accuracy, and especially in the portion below A, while here the simultaneous concussion of the bone is too violent and easily causes confusion between tactile and hearing sensations; in the part above, because here the accompanying air-perception cannot be excluded with certainty.

Additional examinations with other sources of sound which contain only one or a few impure tones, as Politzer's acoumeter, the watch, etc., seem unnecessary, as in the presence of extensive and uneven involvement of the hearing scale of the diseased ear a uniform examination with a single or a few tones will now give a satisfactory insight into the complex changes found in ear disease.

An especial examination of those tones would be of interest whose pitch corresponds to speech sounds. These, especially as regards the consonants, have not been generally located with sufficient certainty in the tone scale.

II.

DESCRIPTION OF THE METHOD FOR THE EXAMINATION OF HEARING.

I agree with Oscar Wolf that the examination with the speech in every case is essential and our best means to gain a general survey of the hearing power in a given case.

The whispering voice is probably universally used when it can still be perceived near the ear. The intensity of this

source of sound can be regulated by the exclusive use of the reserve air remaining after a forced expiration.

In this examination the numbers 1-100 can be used. The more or less characteristic deafness for certain numbers in some ear diseases has been described in my "Report on the Present Position of the Examination of Hearing" at the fifth meeting of the German Otological Society in 1896.¹

A further functional examination is necessary:

1. Where a discrepancy exists between the objective otoscopic examination and the diminution of the hearing for speech.

A rapid sinking of the hearing power in the course of an acute or chronic purulent otitis is of importance in the diagnosis and treatment, as was also mentioned by Habermann at the Sixth Congress of the German Otologists in the discussion of my paper. If, for example, during our observation complete monolateral deafness appears in a short time in the suppurating ear, as is shown in labyrinth necrosis, from this symptom alone in an acute purulent otitis, operation is urgently indicated.

2. A functional examination cannot be neglected in the many cases of moderate or slight deafness where the *Mt* and the middle ear show no objective changes.

Our procedure is as follows:

(a) Determination of the upper and lower limits with the continuous tone series.

(b) Measuring the hearing duration (usually for A and a¹) from the vertex after Schwabach.

(c) Rinne's test (usually with a¹) with the difference noted in seconds between air- and bone-conduction.

(d) Weber's test.

3. To obtain a satisfactory picture of the diminution of hearing in the range of the tone scale in high-grade deafness and in one- or double-sided deafness for speech we must employ, besides the above, the entire series of clamped forks and in bilateral deafness the determination of the air-conduction with pipes in small intervals before each ear.

¹ These ARCHIVES, vol. xxv., No. 3, and *Funktionsprüfung des menschlichen Gehörorgans*, Wiesbaden, Bergmann, 1897, p. 203.

If we desire to demonstrate partial defects for separate areas besides real islands and gaps, the tedious determination of the hearing duration is necessary—that is, the time during which the fork can be heard by our own or a normal ear after its perception by the affected ear has ceased.

This latter examination is also necessary to determine one-sided complete deafness. With this method, necrosis of the cochlea can be diagnosed long before the sequestrum appears.

The examination with the entire tone series for air-conduction is of value not only theoretically but practically in the examination of

4. *Deaf-Mutes.* The hearing remnants found in the ears of deaf-mutes, which must not only be demonstrated but the hearing duration tested, give us the only indication of the possible value of speaking instruction.

That the teachers in the deaf-mute schools have not a sufficient knowledge of the hearing remnants possessed by their pupils is proved by my examinations, which show that there were several deaf-mutes with remnants of hearing, who were considered to be totally deaf because they either did not speak at all or imperfectly. After an examination with the tone series, and after a suitably arranged plan of instruction, making use of the ear, had been carried out for a year, these pupils belong to the best speakers among those instructed by ear.

Other methods of examination, such as Gellé's, and Denner's quantitative examination, etc., may of course be tried.

To permit a functional examination of every doubtful case, it is necessary to limit the examination to that which is of greatest value in the diagnosis; this will explain my selection of the above tests.

III.

A UNIFORM METHOD OF EXPRESSION FOR THE ANNOTATION OF OUR HEARING TESTS.

For whisper or conversational voice it is sufficient to note the hearing distance for the word which was perceived the poorest (number) with the special mention of the same.

The distance in centimetres or metres of an improvement in hearing is found given in literature without mentioning the hearing distance which is present ; this is of course valueless.

Great confusion exists at present among authors in the enumeration of the tone scale. The one uses large, the other small letters ; the numerals for the octaves are placed by some above, by others below the letter ; others again only give the letter in apostrophe <<a>>, etc.

The remedy is easy. We should follow the numeration given by Helmholtz in his book, *Die Lehre von den Tonempfindungen*. These are as follows :

C ₂	C ₁	C	c	c'	c''	c'''	c''''	c'''''	etc.
16 v.d.	32	64	128	256	512	1024	2048	4096	

It is perhaps a useful simplification to write c^{iv} instead of c''', etc.

As Rinne's, Schwabach's, and Weber's tests are regularly employed, the expressions positive and negative are apt to be misleading. For the Rinne and Schwabach these expressions are perfectly clear and logical, and it is desirable to add the positive or negative number of seconds. In Weber's test these terms are unsuited ; it is better to simply state the more or less or not affected ear in this manner.

To obtain a more accurate expression of all the possibilities which may produce the failure of Rinne's test, I have started with the difference t- \mathcal{S} , in which t stands for the time of the air-conduction and \mathcal{S} for that of bone-conduction of the examined ear.

If the fork a is only perceived by air-conduction and is not heard when placed on the mastoid process, then $\mathcal{S} = 0$ and Rinne is + t ; if the fork is not perceived by bone-conduction or not at all by air-conduction t = 0 and Rinne is - \mathcal{S} . All other possible conditions, according to the preponderance of t or \mathcal{S} , are expressed in seconds with the positive or negative difference in numbers between t and \mathcal{S} . If the normal failure of Rinne's test is not known for a given tuning-fork, as for instance in the fork aⁱ used by me (+ 30 sec.), the number in seconds must be added in brackets. This method of expressing Rinne's test is simple and easily

comprehensible, and is at the present time used by several authors.

In applying Rinne's test with the lower forks (a and A), as to the location of the bone selected, the vertex is preferable to the mastoid, because the size of these forks precludes even a partial localization of bone-conduction to one ear alone.

To insure an equal pressure of these forks in Schwabach's and in Rinne's tests, it is simplest to let them rest on the vertex by their own weight.

The lower-tone limit is given by the lowest tone that can be perceived, an island by the two border-tones still perceived, a gap by the two border-tones not perceived.

The upper-tone limit can be accurately determined to $\frac{1}{16}$ mm of the subdivision for the normal or the defective ear by Edelmann's modified Galton whistle, with movable mouth-piece. The highest tone, which usually lies for the normal ear at a length of 0.2 mm of whistle tube, can be perceived with great accuracy and at some distance (5 m or more) from the normal ear. It is well to mention besides the length of the whistle tube, also the hearing distance for the upper limit. Therefore, in place of moving the piston exceedingly small distances, about which the normal upper limit varies, the distance is noted at which the approximately highest tone is heard by the sound ear, usually in metres, and by the defective ear usually in centimetres. The determination is thus made easier and more accurate.

With the modified Galton whistle the upper limit for the normal ear is usually 0.2 for 5 m or more distance. As the normal limit is not the same for all Galton whistles, each normal must be added in brackets.

The examination of the hearing duration for each of the above mentioned unclamped forks is the following: The difference in the perception of the fork by the sound and the affected ear is given by measuring the time the fork takes to die out in front of the sound ear after it has ceased being perceived by the abnormal ear. If the hearing duration of the normal ear for each fork equal 100, then for the affected ear it could be determined by the formula $x = \frac{n-t}{n} 100$, where n is the hearing time for the normal ear for the fork in use, t the

time (in seconds) by which the normal ear hears longer than the affected one. The results of these formulæ may be directly compared.

This notation is satisfactory as a description of the hearing acuity ; a smaller or larger value of the hearing duration corresponds to a smaller or larger value of hearing acuity.

A more correct impression is obtained when the relation of the diminished to the normal hearing duration is replaced by the relation of the corresponding tuning-fork elongations.

Edelmann has recently worked out a table giving the proper relation of amplitude for each hearing duration from 0-100. This will permit a quick translation of time coefficients into those of elongation.

A CASE OF CEREBRAL ABSCESS FOLLOWING PURULENT INFLAMMATION OF THE MID- DLE EAR—OPERATION—EVACUATION OF ABSCESS—DEATH.¹

By CHARLES H. MAY, M.D.,

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THE following history is interesting since it adds another to the number reported within the past few years, in which a brain abscess was suspected, correctly diagnosed, and quickly evacuated, but in which such surgical intervention was unsuccessful in saving the life of the patient because the opportunity to operate presented itself too late. The abscess was of the size of a large walnut, single, its wall about 4 *mm* in thickness; it was situated in the middle convolution of the left temporo-sphenoidal lobe, entirely in the white substance of the brain at a depth of about an inch: there was no meningitis. The mastoid process was eburnated, as it is so frequently in these cases; the attic was filled with pus, granulation tissue, and cholesteatoma; the tegmen tympani presented no opening or caries, and the dura covering this part was not abnormally adherent nor changed; there was no direct connection, therefore, between the source of infection in the ear and the abscess.

Mrs. M. B. was admitted to my service in the Mt. Sinai Hospital late in the afternoon of January 10, 1900. She was in a semi-comatose condition; the following history was obtained from

¹ Reported at the New York Otological Society, January, 1900.

a member of her family and supplemented by information from the physician who had her in charge for several days previous to admission.

Previous History.—Two years previously the patient had severe pain in the left ear, followed by a discharge; the latter continued for one year and then ceased. The patient was well until two weeks before admission, when she began to complain of pain in the left ear, followed by a scanty discharge. The day before admission to the hospital, she became irritable and excited; she began to scream and moan; this stage was soon succeeded by drowsiness. On the morning of admission the family physician noticed some interference with speech, but the exact nature of this aphasia was not determined. There had been no vomiting, no chills, no fever, no convulsions, no paralyses, no polyuria, no incontinence of urine or fæces.

Examination on Admission.—The patient is semi-comatose; pulse 60 and irregular; respirations 20; temperature 99.6°. The pupils are contracted (this condition may have been the result of drugs received before admission to the hospital), but responded to light; after dilatation of the pupils with a mydriatic, examination of the fundus showed papillitis of moderate severity on both sides, but more marked on the left side.

The left external auditory canal is somewhat reddened and swollen and filled with offensive purulent discharge. After removal of this, a large perforation of the *Mt* was found. The entire left mastoid region was exceedingly tender to pressure, but there was no swelling or redness of this area.

Though it was impossible to make an exact diagnosis on account of the semi-comatose condition of the patient, the absence of localizing symptoms, and the insufficient data conveyed by the previous history, it was evident that the patient was suffering from cerebral compression; the slow pulse, partial unconsciousness, and optic neuritis made such a diagnosis probable. The condition of the ear and the previous history of aural suppuration pointed to an accumulation of pus as the cause of the compression. In the absence of localizing symptoms, it was, of course, impossible to say whether this accumulation was epidural or in the substance of the brain, or to locate it definitely. It seemed probable, however, that it was in the neighborhood of the

middle ear of the left side. The patient was prepared for operation, and within a few hours the operation was performed.

Operation.—Anæsthetic, chloroform changing to ether. An extensive incision was made over the mastoid, one quarter of an inch removed from the attachment of the auricle, extending above to a point corresponding to the upper limit of the auricle and below to the tip of the mastoid. The periosteum was healthy. The incision was made down to the bone, bleeding vessels ligated, and the periosteum and overlying parts separated by retractors, leaving a large field for operation. The usual opening into the mastoid was made with chisel and mallet. The bone was eburnated and almost entirely devoid of cells. After proceeding to the depth of seven eighths of an inch a small space was found which was taken to be the antrum; it was empty. The mastoid was then chiselled away in the direction of the tip and found unaltered except by the eburnating process already alluded to. The sinus was not exposed because there was no suspicion of involvement of this part.

The incision through the scalp was next prolonged upwards and backwards. A point was chosen for entering the cranium, one inch and a quarter behind the centre of the external auditory meatus, and an inch and a quarter above its horizontal plane. This point was selected for the opening in the absence of definite localizing symptoms, because this region serves as a good centre for exploration in various directions. A piece of bone about the size of a cent was removed with the chisel. The dura was somewhat congested but otherwise normal. A good-sized needle attached to a small aspirator was pushed into the temporo-sphenoidal lobe in a direction towards the median plane and somewhat forward; at a depth of one inch, pus was encountered, and about one drachm withdrawn; it was exceedingly offensive.

The opening in the cranial bones was enlarged with bone-forceps until it measured an inch in diameter, the dura corresponding to this space divided, and a free incision made into the brain substance in the direction shown by the needle; another drachm of foul-smelling pus, together with necrotic brain tissue, escaped. Gentle probing showed that the cavity was enveloped by a wall, and its extreme internal limits were somewhat over two inches from the surface. The abscess cavity was cleansed and irrigated

with a normal saline solution, and a drainage-tube and gauze drain inserted. The incision through the soft parts was sutured at the extremities, leaving the areas corresponding to the cranial and mastoid openings free; these were packed with iodoform gauze; the usual dry dressing was applied and kept in place by suitable bandages.

Course.—At the end of the operation, which had consumed an hour and a half, the patient's condition was the same as upon admission to the hospital. After removal to the ward, she became very restless; a hypodermic injection of five-minims of Magendie's solution was given. The pulse continued slow, and soon became more irregular. Two hours after the operation there was contraction and rigidity of the left leg and divergence of the eye-balls, the pulse became more irregular; strychnine was given hypodermically. At 2.30 A.M., pulse 80, respiration 36, and temperature 102°. The patient died at 3.45 A.M., January 11th.

Autopsy (brain only).—No autopsy was allowed, but by enlarging the operation wound, a satisfactory examination of the brain was obtained. The abscess cavity was found in the middle convolution of the left temporo-sphenoidal lobe, about the size of a large walnut, entirely in the white substance of the brain. Its wall consisted of purulent matter and fibrin, and had a thickness of 4 mm. Microscopical examination of some of the contents of the abscess showed the presence of streptococci in large numbers. No other abscess was found. There was no perforation into the ventricles, no sign of meningitis, no involvement of the sinuses. The dura could easily be removed from the tegmen tympani and appeared normal. There was no opening or caries of the tegmen tympani. On removing this covering the attic was found full of pus, granulation tissue, and cholesteatomatous masses.

A FATAL OTITIC ABSCESS IN THE LEFT
TEMPORAL LOBE OF THE BRAIN CAUS-
ING WORD-BLINDNESS. OPERATION. AU-
TOSY.

By HERMAN KNAPP.

(*With one text illustration.*)

CASES of failure which by better appreciation of existing conditions or prompter action might have been turned into successes should always be published as warning examples. They are no less instructive than the favorable ones, and give a mighty stimulus for improvement not only to the candid author but also to the judicious and fair-minded reader. The following case may serve as an example in point:

Fanny W., twelve years old, New York, came under my care December 18, 1899. She had had left-sided otorrhœa from childhood off and on. Eighteen months ago while in the country she had "an abscess in her left ear," and more or less discharge from the ear ever since. Four weeks ago she had an attack of intense frontal headache with nausea and vomiting. She was more or less ill during these four weeks. December 17th, she became unconscious at 6 P. M. and had violent convulsions for the next six hours. Dr. Fruitnight, the family physician, ordered icebags to the head. The convulsions ceased. I was asked at 12 M. the next day to see the patient in consultation. We met at 1.30 P.M., and found the patient excited and exceedingly frightened but conscious and rational. Her temperature was 101° F., her pulse 100. Movements and sensibility normal. Pupils, backgrounds of eyes, sight, and *field of vision* normal. Very scant secretion in left ear; fundus of ear canal not clearly seen, but free from

granulations ; no sagging of posterior-upper wall ; slight swelling and tenderness of mastoid. Optical amnesic aphasia pronounced. When an object was held before her and she was asked what it was, her face brightened with attention, while she looked perplexed and said, "I know what it is, but cannot name it"; when told, she instantly and correctly repeated the word. For instance, a watch was held before her; she looked puzzled and somewhat angry from not finding the name. When told, she at once said : "Oh, yes, a watch."

The clinical diagnosis of Dr. Fruitnight and myself was: *deep mastoid and epitympanic caries, epidural and cerebral abscess, beginning meningitis*. We told the relatives we felt sure that surgery only could save her life, and that an operation should be done without delay ; the prolonged convulsions were the last warning. The relatives consented. She was taken to the New York Ophthalmic and Aural Institute and operated on by the writer, with the assistance of Drs. Fruitnight, Jordan, Nolte (the house surgeon), and several others, at six o'clock the same afternoon.

Operation : After the usual preparation an incision was made down to the bone, from the tip of the mastoid along the insertion of the auricle, as far as the zygomatic ridge. The bone surface, freed from the periosteum with a raspatory, was vascular, more in the lower than in the upper part. The skin lining the posterior and upper meatal walls was dissected from the bone and drawn out and forward with a strip of aseptic gauze passed, along the bared bone, into and out of the ear canal. The mastoid, when opened, was found diploic, vascular, and very brittle. The posterior and upper walls of the bony ear-canal were chiselled away and the antrum and attic were laid bare. The latter was packed with cholesteatoma masses, which were cleanly removed.

Then the *posterior cranial fossa* was exposed by chiselling and curetting away all the carious bone that separated it from the body of the mastoid. The dura and the sigmoid sinus, open to view, showed no abnormality. There was neither epidural abscess nor external pachymeningitis.

After this the upper wall of the attic, which was carious, was removed and the *dura of the middle cranial fossa* exposed in an area 2.5 cm by 2 cm. The dura was congested and also slightly uneven and dull. Near the posterior-medial corner of the exposed area I noticed in the dura a *blackish round spot* of about 3 to 4 mm in diameter, with a central depression through which

I could introduce a probe 4-5 cm into the brain, without meeting with any resistance or eliciting blood or pus on withdrawal. The latter condition and the late hour of the day determined me to *interrupt the operation*. The radical tympano-mastoid operation and the opening of both the middle and posterior fossæ, having removed the source of the whole disease and relieved the brain from pressure, could be supposed to place the patient beyond immediate danger and into more favorable circulatory and mechanical conditions for amelioration of the symptoms, and might furnish during the next days a clearer indication of the location of the abscess. The wound, therefore, was cleansed with aseptic gauze, the meatal skin-flap split horizontally, and the outer edge of the latter extended by two vertical incisions. The flap was pressed against the wound of the mastoid with sterilized iodoform gauze, the ear bandaged, and the patient put to bed.

December 19th.—Night quiet. Feels better ; is rational. Names most objects at sight. Temperature, ranging from 101° to 102°. Pulse, from 110 to 120.

December 20th.—Still better. No word-blindness. Is cheerful. Temperature, 99.3° to 101°. Pulse, 80 to 100.

December 21st.—Fails to name some objects she sees. Is quite rational. Appetite good. Temperature varying from 99.2°, pulse 80, to temperature 100.3°, pulse 118. Dressing of wound changed ; smells strongly.

December 22d.—Quite rational. Appetite poor. Nausea and severe headache. Dressing changed. Temperature 99.3°, pulse 100, to temperature 101.3°, pulse 120. Morphia.

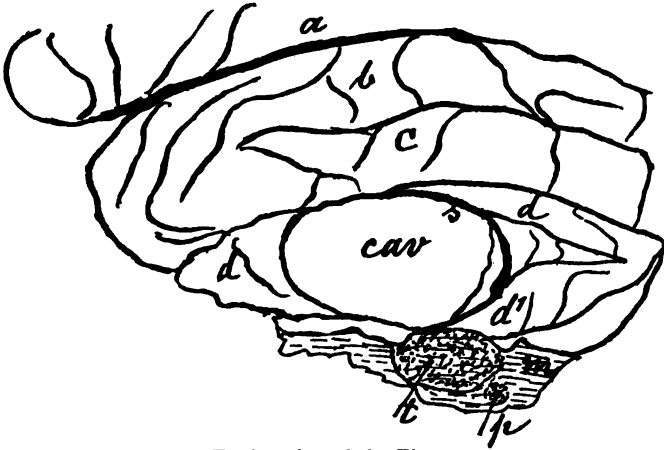
December 23d.—Sleep interrupted. Nausea. Severe headache. Anorexia. Temperature 99°, pulse 96, to temperature 100.8°, pulse 108. Quite rational. Wound clean.

December 24th.—In the morning, some nausea and vomiting ; slight secretion. Severe headache. No appetite. 2 A.M., temperature 97.4°. At 5.30 A.M., temperature 98.2°, pulse 80 ; 11 A.M., temperature 98.3°, pulse 70 ; 9 P.M., temperature 100.2°, pulse 60. In the morning, complained greatly of headache. Morphia. In the afternoon, slept soundly and felt pretty well ; in the evening, headache and drowsiness.

This being the first day that the elevated temperature, the slow pulse, and the other symptoms had the character of a brain abscess, an operation was decided upon for the next day.

At 9.45 P.M. she suddenly gave a shriek, jumped out of bed ; her face grew purple. At 9.50 she stopped breathing ; face white ; tongue protruded, and foam coming from the mouth. Death.

Autopsy (partial only allowed): Wound clean ; skull thin. The dura shows dark venous congestion. Very few adhesions of the dura to the anterior surface of the petrous bone, some also to the occipital lobe. The dura, as far as exposed by the operation, was thickened by granulations—*t* in accompanying figure. The blackish, centrally perforated patch (*p*) still well recognizable. After incising the dura, the blackish patch was found agglutinated loosely to the pia. There was no subdural exudation, and the soft membranes showed no conspicuous abnormality. The veins in



Explanation of the Figure.

a, Sylvian fissure ; *b*, *c*, *d*, first, second, and third temporal convolutions ; *car*, abscess cavity ; *t*, abscess wall ; *d'*, lower surface of third temporal convolution ; *t*, thickened dura which had been exposed during and since the operation ; *p*, perforated black patch of the dura mater, *m*.

the Sylvian fissure (*a*) were much congested, the gyri and sulci darkened, the latter effaced, *i. e.*, only indicated by lines. The first temporal convolution (*b*) looked tolerably healthy, the second (*c*) slightly, and the third (*d*) very much discolored. In the middle part of the temporal convolutions the brain substance was softened to the extent of 8.5 *cm* in length and 5 *cm* in height. The softening was immediately above the black patch (*p*), where the dura (*t*) was perforated.

The right hemisphere showed no abnormality.

After the brain had been removed in toto, it was divided in the median line. At once a large quantity of thin purulent offensive

liquid, with many small particles, flowed out from the third and the left lateral ventricle. The walls of the ventricles were finely uneven. Temporally from the lateral ventricle a large abscess cavity (*cav*) was situated, surrounded by a dense white capsule (*s*), which was ruptured in front and toward the lateral ventricle behind. It contained the same material as the ventricles. The capsule of the abscess was surrounded by a zone of softened brain substance varying from 5 to 15 *mm* in breadth. The track of the probe which had been introduced into the brain could not be discovered.

After hardening in formol the following conditions were ascertained:

Antero-posterior diameter, 185 *cm* (7 inches). An abscess cavity (*cav*) occupied the middle of the temporo-sphenoidal lobe, situated a little more in the anterior part than in the posterior. It was surrounded by a dense, uniform white capsule (*s*), the thickness of which varied from 0.5 *mm* to 5 *mm*. It was perforated in two places: (a) in front, the contents being mixed with the broken-down surrounding tissue; (b) at the posterior medial wall into the posterior outer cornu, the contents filling the lateral and third ventricles and mixing with the softened cortex of the adjacent posterior part of the temporo-sphenoidal lobe.

The inner dimensions of the abscess cavity were: Sagittal, 45 *mm* (1 $\frac{3}{4}$ inches); vertical, 26 *mm* (1 inch); horizontal, 20 *mm*.

The inner surface of the abscess cavity was smooth, with some depressions here and there; in the neighborhood of the perforations of the capsule it was uneven and softened.

Remarks.

A feature of the case was that during a period of nine or ten years there were no ear symptoms of any significance. Then, for two years the symptoms were mild and transient, but became acute during the last four weeks. They pointed more toward a meningitis than an abscess, and meningitis was also the diagnosis of probability held by Dr. Fruitnight. Even after the operation the general symptoms were not characteristic of brain abscess, for elevation of temperature was not combined with slow pulse, except during the last twenty-four hours. It was surprising to me that at the operation and at the autopsy neither meningitis nor epidural abscess, but a plain cerebral abscess, was found. This is

explained by the thick capsule, which shows that the abscess was very old and accounts for the long period of latency.

At the operation I thought I was sure of the presence of an abscess. Apart from the history and the word-blindness, the cholesteatomatous deposit in the attic, the caries of the roof, the congestion and a slight thickening of the exposed dura, and the small perforated, discolored patch of the dura over the necrosed tegmen tympani seemed sufficient evidence for the presence of an abscess. The negative result of the exploration of the brain with a probe, made me hesitate and put the operation off. The autopsy has demonstrated that the abscess was near the black patch in the dura, as usual (Körner), and that probing is not reliable in searching for cerebral abscess. The exploring instrument should be an aspirator with a sharp needle of sufficient calibre to suck up thick and grumous pus, or, still better, a knife with a sharp point and at least 4 mm in breadth. Either of these instruments might have drawn the pus, and yet either might have failed, like the probe. The abscess had a thick, tough capsule on its lateral side, which it might not have been easy to perforate. This supposition is not merely theoretical, for it was exemplified by a case of one of my New York colleagues in which a cerebellar abscess had been diagnosed with full confidence, yet the aspirating needle failed to elicit pus. At the autopsy it was found that the abscess was at the place where it had been thought to be; the needle had touched its wall, which was unbroken and so dense that the needle could not pierce it.

As to the precise location of the optic memory centre, our case furnishes no addition to the stock of knowledge acquired thus far. We are taught that this centre is in the temporo-sphenoidal lobe. To verify this broad statement our case, indeed, offers another example, but does not show the precise place, for the softened area was too large. I may say, however, that now, after hardening the brain, the cortex of the superior temporal convolution was not softened anywhere, and that of the middle convolution was softened only at its lower border and in a small patch in its middle part, whereas the

third convolution, both on its lateral (*d*) and lower surfaces (*d'*), was most extensively softened.

Another noteworthy feature in our case is the **absence of optic neuritis and homonymous hemianopsia**. It shows that the inflammatory symptoms produced by the abscess were not intense or old enough to produce choked disc, and that the fibres of the optic radiation had escaped destruction. It is stated, without an attempt at explanation, that optical aphasia is frequently, but by no means always, combined with hemianopsia. The separation or combination of optical aphasia and hemianopsia may be of value in localizing a focal disease.

As to the **explanation of the symptoms and course of the disease** during the last four weeks, we may fairly assume that the aggravation which led to the patient's death was caused by the abscess extending beyond the confines of its capsule. Renewed inflammatory action caused the various symptoms found in meningitis and in abscess, and led to a marked exacerbation, violent convulsions for six hours, etc., when the first perforation of the capsule, that in the anterior part, poured a portion of the contents of the abscess into the surrounding brain tissue; whereas the second perforation, that into the ventricles, caused the sudden death. The notable improvement after the operation is a well-known consequence of relieving, in inflammatory brain disease, the intracranial pressure by opening the skull.

REPORT OF THE SECTION OF OPHTHALMOLOGY
AND OTOTOLOGY AT THE NEW YORK ACADEMY
OF MEDICINE, NOVEMBER 20, 1899.

OTOLOGICAL PART.

By DR. J. H. CLAIBORNE, SECRETARY.

The President, Dr. PETER A. CALLAN, in the chair.

Dr. E. GRUENING presented a case of **otitic brain abscess with operation and recovery**. The patient was shown. He was a small boy, the son of a physician, who had had earache for two weeks. The temperature rose. Pain finally ceased, but inasmuch as there was still fever the idea of malaria was entertained. He continued to complain. The ear stood off somewhat from the head. When brought to him the boy appeared to be bright, there was no pus in the ear, but Shrapnell's membrane was red and swollen. Operation was performed upon the mastoid. The cortex was sound. The antrum was exposed. Some pus was found and the mastoid was filled with granulation tissue. The lateral sinus was exposed; then the anterior wall of the antrum. He found the dura bare and discolored. There was caries in the antrum. The incus was removed easily. Operation was discontinued and the case observed. At the end of the fifth day the temperature rose to 105° F. and the patient vomited. Then pus appeared in the ear. The patient became unconscious, the temperature rose, and pus appeared again. There was some improvement but the incision was carried forward in the soft parts, the squama exposed, and its lower portion removed. There was a fistulous opening present which being cut into brought forth two drachms of creamy, inodorous pus. Apparently there was no pyogenic membrane. It was packed dry with iodoform gauze. Dry treatment was continued. There was a large prolapse of brain tissue which finally shrank. When almost well the patient one day suddenly became speechless and had several convulsions.

The region was explored once more but no pus was found. These symptoms disappeared and the patient made an uneventful recovery. Dr. Gruening concluded that the last symptoms were hysterical. It was of interest that there was no suppuration of the middle ear and that the result was so favorable.

Dr. LEDERMAN in the *discussion* referred to one of his cases of o. m. p. c. which was at first thought to be malaria. There was no swelling in the mastoid but there was a painful point above it. The plasmodium of malaria was found in the blood. On operation an epidural abscess was discovered.

Dr. FREDERICK WHITING called particular attention to the removal of the squama in Dr. Gruening's case. He thought it was unusual but considered it the proper thing to do. He favored opening the squama along the arch of the auditory meatus and backward, and pointed out that under such circumstances the drainage was better. He had a case similar to that of Dr. Gruening and opened the abscess. The patient died of leptomeningitis suppurativa.

Dr. H. KNAPP referred to statistics of abscess in o. m. p. acuta and said that it was not so rare, about 15%. As to Dr. Whiting's suggestion in regard to opening the bone he said that this method was first advocated and tried by Rose and followed by v. Bergmann and many others. He referred to the difficulties presented in some cases by the thickness of the zygomatic ridge.

Dr. MCKERNON referred to a case of o. m. p. a. which he had reported. The case ran a course of three weeks and was moribund when he saw it. There was a small quantity of pus in the mastoid. He exposed the dura and found two drachms of dark-colored pus. He was unable to say where the pus came from but found an opening above the tegmen tympani.

Dr. GRUENING said that the abscess in his case was found to contain streptococci longi. Examination of the eyes was negative.

Dr. POOLEY reported a case of **osteoma of the auditory canal and exhibited a specimen**. The patient was an Italian, the lumen of whose auditory canal was almost occluded. The swelling was covered by common integument. The use of the probe revealed the fact that the swelling was due to osteoma. Probing revealed swelling of tragus and the post-auricular region. Some pus came from the canal. The osteoma was grasped with Hinton's forceps and was removed with ease. The posterior

wall of the meatus was the site of granulation tissue which was scraped away and the canal packed and antiseptically treated. He considered the case a successful one.

Dr. E. B. DENCH said that it was well in some cases to remove these osteomata from behind the ear. He referred to the trouble which is sometimes caused by the impaction of cerumen in the canal and the advisability of treating such cases by operating behind the concha.

Referring to Dr. Dench's views, Dr. H. KNAPP said that this treatment had been described by him about twenty years ago and referred to by Schwartz in his *Handbuch*. He and others had published cases operated upon in the same way since.

Dr. WHITING detailed a case of impacted cerumen in which there was also o. m. p. a. Two exostoses occluded the view of the fundus of the ear, but the symptoms of the case pointed only to impacted cerumen. The unskilful attempts of a physician to remove the cerumen caused pain and suppuration. The exostoses were subsequently removed.

Dr. POOLEY in reply said that he was aware of the facts referred to by Dr. Dench and Dr. Knapp. He saw no occasion to attack his case from the rear inasmuch as the exostosis was easily removed with forceps through the auditory canal. He thought the surgeon ought to be selective in his treatment.

Dr. MAX TOEPLITZ reported a case of suppuration of the right ear in a young man aged seventeen. Following upon hardness of hearing, pain under the right ear occurred. Shortly afterward chills set in, with a profuse discharge from the ear. The mastoid was sensitive but not swollen. The facial muscles twitched. The background of the eye was normal. The region of the right internal jugular was painful upon pressure. There was swelling of the right ankle. The mastoid was opened and connection with the middle ear was made. There was no pus in the mastoid, but between the inner plate and the sinus a few drops were found. The sinus was laid bare and was found to be yellowish-green in color. The middle cerebral fossa was free. The patient collapsed and operation was interrupted. Suppuration of the right ear ceased. The leg then became more swollen, chills appeared again, the right hip swelled, then the right shoulder. After another chill the sinus was exposed and two ounces of pus removed. At his request the jugular vein was laid bare by Dr. W. Meyer as far down as the clavicle, doubly ligated, and partly

excised. A few days afterward the right wrist swelled. More chills followed. The nose discharged a serous secretion mixed with blood. Isolated pulmonary infarctions with encapsulated pleuritic effusion were found and aspirations made. The left leg swelled. Endocarditis set in with a chill. At the end of three weeks from the beginning of treatment improvement took place until final recovery resulted. The wound closed after several months. There was albumen in the urine from the beginning. Perforation of the right membrana tympani was closed by a secondary drum and the patient heard with the right ear conversation at ten feet. The patient was exhibited and a large scar was shown which extended from the mastoid down over the region of the internal jugular to the clavicle.

Referring to Dr. Toeplitz's remark that this was the first case on record in which general pyæmia had occurred as a result of mastoid complication, Dr. POOLEY said that this was not so. He referred to a case which went through all the symptoms of pyæmia and finally recovered. He desired to correct this statement.

Dr. LEDERMAN mentioned a case which he said was similar to that of Dr. Toeplitz. He said that in his case recovery was due to removal of the source of infection. He related the history of the case in detail. The patient had exhibited symptoms of mastoiditis without any tenderness along the jugular. The sinus was exposed, aspirated, and a syringe of pus but no blood was evacuated. He pushed the probe toward the torcular and a little blood escaped but no pus. He attempted to find the jugular above the clavicle but only found a small vein and removed some pus from the thrombus. The patient improved. After cutting down on the neck and removing some enlarged veins there was an uninterrupted recovery.

Dr. GRUENING desired to congratulate Dr. Toeplitz on the successful treatment of his case. He called attention to the scar in the neck. He said he thought some discrimination should be made in the matter of making such a wound as this in men and in women. It is not always necessary to cut down upon the jugular. The first thing to do is to open the thrombus and see if it is infectious; if so, the infectious material should be removed.

Dr. WHITING referred to the danger of infecting the wound of the jugular. He said that the injudicious use of the probe was apt to tear or force the visceral wall and set up leptomeningitis. He said that such a thing had been known to occur. He

suggested pulling down the vein and cutting off a piece of it, as this was a safer procedure.

Dr. TOEPLITZ in closing the discussion said he did not consider Dr. Lederman's case similar to his. He agreed with Dr. Whiting that syringing would better be abandoned, but he could not subscribe unqualifiedly to the doctrine of pulling down the vein and excising it.

Dr. R. C. MYLES reported a case of **removal of the cochlea and parts of the semicircular and facial canals through the external auditory canal** and presented the specimen by proxy. The patient had suffered from epithelioma in the region of the zygomatic arch. This had been cured after operation and local treatment by his former attending surgeon. The membrana tympani and the tissues covering the outer ear had disappeared, and white, dead bone was visible in every direction. The facial nerve was paralyzed. The membranes of the foramen ovale and rotundum were absent. He decided to remove all dead bone possible through the external auditory canal. He thought the process extended down to the petrous portion of the carotid artery and that a radical operation might cause a fatal termination if he removed the necrosed artery where it coursed close to the middle-ear spaces. He therefore decided to use a large silver tube. He incised the canal in order that the tube might enter, and he removed large granulations as they formed. He succeeded after two years' treatment, aided by the process of exfoliation, in removing all the necrotic bone. The patient had been discharged cured several months since. The facial paralysis and complete deafness still remain.

By limitation of time the meeting was adjourned.

REPORT OF THE SECTION OF OPHTHALMOLOGY
AND OTOTOLOGY AT THE NEW YORK ACADEMY
OF MEDICINE, DECEMBER 18, 1899.

OTOLOGICAL PART.

BY DR. J. H. CLAIBORNE, SECRETARY.

Dr. FREDERICK WHITING read the paper of the evening, entitled **The indications for incudectomy during operations for acute purulent otitis media and mastoiditis, as a prophylactic measure against subsequent chronic suppuration.**

The author said that the elements which chiefly contributed to early necrosis of the incus during the progress of suppurative otitis are three in number and that the order of their relative importance might be thus expressed: (1) scanty vascular supply; (2) suppuration of the ossicle; and (3) the shape of the ossicle. He said that the first is the most important element in the causation of early and rapid necrosis of the incus. The second and third are also contributing factors in bringing about such a condition. He said his limited personal experience and observation led him to extract the incus as a prophylactic measure against chronic suppuration under the following conditions:

1. Whenever, by inspection, probing, or otherwise, caries of the incus can be demonstrated.
2. Whenever, by accidental curetting about the aditus or by careless manipulation, the incus has been dislocated.
3. In all cases of scarlet fever or measles if the discharge has existed for four weeks, and in similar cases, irrespective of the duration of the discharge, if streptococci predominated as the infective agent.
4. In every case in which the discharge has persisted for three months or more.

He based his views upon four cases which he detailed at length. The writer deplored the fact that he was unable to bring forward more cases to support the views he had advanced, and advocated a conservative attitude toward such a departure. He deprecated the wholesale mutilation of the tympanum by extravagant and misdirected zeal.

Dr. GRUENING, in the discussion which followed, said that in acute cases in former times it was considered best to operate upon the mastoid and pneumatic cells, but that during the last five or six years we had concluded to go farther. The incus is often dislocated in these operations. He said he could not hold with the writer that caries often occurs in acute suppuration. He had often lifted out the incus without any difficulty and concluded that it had been dislocated. He recommended caution in the use of the probe. Among several cases of removal of the incus he had found caries of the bone in one. He considered the necessity for removal of the incus rare.

Dr. A. B. DUEL said he had operated upon thirty cases of mastoid inflammation at the Willard Parker Hospital and in three or four of them he had found the incus dislocated but never

eroded. He thought it was too radical a statement to say that it was necessary to remove the incus in every case of scarlatina.

Dr. CHAMBERS had operated upon half a dozen cases of mastoiditis within the last months. He failed to see any reason why he should seek out the incus and remove it in these cases.

Dr. WHITING agreed with Dr. Gruening in regard to the ease with which the incus is dislocated and urged that more care be used in the use of the probe. He said that Dr. Duel was mistaken in one of his statements. He (Dr. Whiting) had referred to cases of scarlatina in which the discharge had persisted for more than four weeks when he said that the incus should be removed. He also said he failed to understand the position taken by Dr. Chambers and deprecated undue enthusiasm in regard to operation.

REPORT OF THE MEETING OF THE NEW YORK
OTOLOGICAL SOCIETY, OF NOVEMBER

28, 1899.

BY DR. H. A. ALDERTON, SECRETARY.

PRESIDENT, DR. C. J. KIPP, IN THE CHAIR.

Dr. F. M. WILSON presented the temporal bone from a case of **leptomeningitis of otitic origin**. A man, forty-two years old, alcoholic and giving a specific history, acquired a cold in March, 1899. Pain developed in the right ear and a few days later the ear discharged. During the spring and summer he had constant discharge from the right ear and five or six attacks of severe right-sided headache. Dr. Wilson saw him for the first time September 9th. He had been in bed for four weeks, with severe pain in the right side of the head, thickness of speech, stiffness of neck, no neuritis. Temperature 101° . The temperature had been normal until within a few days. There was a perforation in Shrapnell's membrane on the right side. The perforation was enlarged and the hot douche, every hour, was prescribed. On September 12th, the patient was worse, semi-comatose, tremulous movements, temperature 103° , increased stiffness of the neck, no external symptoms of mastoiditis. Operation: After penetrating $\frac{1}{8}$ of an inch of solid bone came, upon a large deep-seated antrum, containing pus but no granulations or softened bone, and apparently having no communication with the tympanic cavity. The antrum was thoroughly curetted. The next day the temperature was down and the pain permanently disappeared; the other symptoms grew worse and the patient died comatose. **Autopsy:** There was a large area of leptomeningitis over the base of the brain, also over the whole right lobe of the cerebellum, in which there was a small abscess as well. There was a clot in the right lateral sinus. The dura over the upper surface of the temporal bone was healthy except at the junction of the petrous ridge and

the squamous portion, where there was a foramen leading through the ridge from the posterior fossa to the middle fossa, and being filled with pus. The perforation of the tympanic membrane had healed. Leading back from the tympanic attic into the petrous portion was a pneumatic space, $\frac{1}{4}$ by $\frac{1}{8}$ by $\frac{1}{8}$ inch in diameter, and from it two pin-hole openings, one leading to the antrum and one leading into the unusual foramen at the point of junction of the petrous ridge and the squamous portion. The sigmoid groove formed part of the roof of the antrum. The posterior end of the foramen through the ridge opened into the sigmoid groove. Dr. Wilson believed that the petro-squamous sinus in the foetus ran through this foramen, instead of over the ridge as usual, and that this arrangement of bone and air spaces left open a route of infection—through the upper part of the petrous ridge, over the antrum, into the foramen, and thence to both middle and posterior fossæ, without the necessity of any bone erosion. Incidentally, there was a branch route of infection to the antrum.

Discussion.—Dr. TOEPLITZ asked for information as to the reflexes and the optic nerves. Dr. WILSON: The reflexes were not tested; there was no papillitis. Dr. WHITING compared this case with a case of cerebellar abscess that he had had. Dr. H. KNAPP spoke on the petro-squamous sinus, citing cases in which it had been distinctly traced in just such a position as that described by Dr. Wilson.

Dr. H. KNAPP presented a **new acoumetric test** brought forward by Gradenigo. Time and amplitude of vibration are distinctly shown optically by means of pasters attached to the clamps of the lower tuning-forks. It is not applicable to the higher tuning-forks.

Discussion.—Dr. BACON asked as to whether the pasters could be obtained in this country. Dr. H. KNAPP: This is the only one here but they are very easily made and applied.

Dr. G. BACON reported a case of **sarcoma of the external auditory canal** occurring in a woman fifty years old, who came to the clinic complaining of slight tinnitus and some deafness. Examination showed a tumor apparently filling the external meatus and attached by a pedicle to the posterior cartilaginous canal wall. There was no involvement of the middle ear. It was removed and perfect healing followed. The microscopical examination showed it to be a sarcoma.

Discussion.—Dr. GRUENING thought that clinically it was not a

sarcoma ; histologically it may have been. Dr. SHEPPARD asked as to whether pathologists did not admit that they could not distinguish between sarcoma and round-celled granulation tissue.

Dr. A. DUANE reported a case of **middle- and internal-ear disease produced by the concussion due to gun-firing.** A quartermaster on the *Texas*, six months before the Spanish-American war, had an acute otitis media purulenta in one ear, which healed. During a bombardment, he was in the act of leaving the pilot-house when he was thrown down by the explosion of a gun pointed away from him. He immediately became completely deaf, which deafness later disappeared in the good ear but not in the ear formerly affected. By night that ear pained, discharged, and became completely deaf. One year afterwards, he was seen by Dr. Duane suffering from the same symptoms. There was a small rupture above and forward at the junction with the membranous canal, filled with pus. Functional tests showed complete deafness to tuning-forks, etc. The doctor wished to make a point of the recurrence in the affected ear of an o. m. p. a. leading to o. m. p. c., with the combination of middle- and internal-ear trouble due to concussion.

Discussion.—Dr. WHITING wished to know whether the doctor was sure that the original o. m. p. a. had ever healed. Dr. DUANE thought that it was most likely, in view of the complete absence of symptoms. Dr. WHITING drew attention to the fact that a persistent o. m. p. a. often exists without giving rise to symptoms. Dr. GRUENING thought that it was not rare to find an o. m. p. a. following a traumatic perforation ; in fact it was rather common.

Dr. COWEN reported a case of **frequently recurring transitory deafness and fulness in the ear on one side,** which appeared during the act of speaking and was relieved by pressure upon the tragus. Otherwise there was good hearing on that side and the membrane was normal. The Eustachian tube was open constantly. There was no tinnitus. Treatment did not relieve the condition. Dr. Cowen thought that it might be due to a relaxed drum falling upon the stapes, and that traction upon the tragus pulled the membrane away and relieved this condition.

Discussion.—Dr. BACON agreed with the speaker in that the condition was probably one of relaxation of the tympanic membrane. He thought that the use of Blake's rubber spring might be advantageous in the treatment. Dr. WHITING wished to

know whether the patient was relieved by auto-inflation. Dr. COWEN: No. Dr. MARPLE: How frequently did this condition recur? Dr. COWEN: Very frequently. Dr. MARPLE: Did you try the effect of the use of the pressure probe? Dr. COWEN: No.

Dr. T. P. BERENS reported a case of **accidental vaccination of the external auditory canal**. There was chill and temperature and considerable induration around the ear. The diagnosis was made upon the history and by exclusion; the microscopic examination was negative.

Dr. BERENS also spoke of a case of **peculiar tinnitus**, of a puffing, pulsating character. Pressure exerted upon the cervical blood-vessels did not relieve, but upon letting up on the pressure the tinnitus became much exaggerated.

Dr. J. L. ADAMS wished to be informed as to the experience of the Society in the **use of hot air through the eustachian catheter**. He had had very good results with it. He used a receptacle containing water heated by means of an electrical contrivance.

Discussion.—Dr. BACON wished to know whether both the tinnitus and the hearing had been improved. Dr. ADAMS replied that the treatment entirely relieved the tinnitus in many cases and helped the hearing. Dr. ALDERTON stated that he had recently seen an apparatus devised by Dr. Houghton, of New York, in which the air was directly heated by the electrical current. Dr. Adams had used the instrument without obtaining good results. The temperature could not be regulated. The objection to the hot-air treatment consists in the apparent inability to obtain an even temperature.

Dr. ROBERT LEWIS reported a case of **deafness due to concussion from gun-firing**. The patient, a sailor, had the right side of his face within a few inches of the muzzle of a saluting gun when it was discharged. The man was knocked down senseless and, on his regaining consciousness, dizziness was so marked as to make it impossible for him to walk unaided. The next day, on examination, the right membrana tympani was found to be markedly hyperæmic, and with total loss of hearing on this side. Hearing on the left side was about one-half of normal. The patient was ordered to bed and kept absolutely quiet; a fluid diet was ordered. For the first forty-eight hours ten grains of acetate of potash and twenty grains of bromide of

soda were given in solution three times a day; from the third to the twelfth day ten grains of acetate of potash and fifteen grains of iodide of potash were administered in solution four times daily. From the sixth to the twelfth day, an eighth of a grain (increased to a sixth of a grain on the seventh dose) of muriate of pilocarpine was given three times daily. Mild cathartics were also given. On the thirteenth day, the patient could hear the voice at a distance of one foot in the right ear and the hearing of the left ear was almost normal; the dizziness had disappeared. The man was very weak. Above medication was stopped, and a tonic of iron and strychnine substituted. He had become very restless under the hospital restraint. On the seventeenth day he was allowed to sit up for a short time and on the nineteenth day was allowed to go out for an hour; on the twentieth day he was again permitted to go out, and failed to return. Dr. Lewis never saw the patient again, but learned from his brother some two years later, that a few months after the accident he acted queerly, within a year was hopelessly insane, and died within eighteen months. No specific history nor history of former cerebral or aural disease was obtained.

Dr. DUANE stated that with the big guns the concussion was tremendous, while the sound was not so. The smaller guns produce much more distress from sound than the larger ones.

Dr. GRUENING reported a case of **acute mastoiditis with symptoms of herpes** in the course of the third branch of the trigeminus. This was the third case that he had seen; the former two dying. There was a great deal of temperature and frontal headache in all. Operation was proposed, in this last case, by Dr. Whiting one week previously but was not consented to. The cortex was so thick that no tenderness could be elicited on pressure; there was profuse discharge and headache. At the operation very extensive destruction of the mastoid and exposure of the sigmoid sinus was found; very little granulation tissue in the middle ear and in the antrum. The tenderness which had existed over the antrum disappeared with the use of hot applications.

Discussion.—Dr. WHITING remembered the case. The man came to the clinic two weeks before, complaining of an acute purulent otitis media; he was admitted to the hospital and remained four days; the discharge was always slight. After the use of the ice-coil for 36 hours the tenderness disappeared and the

patient was permitted to leave the hospital. He returned later with intense tenderness over the mastoid and post-mastoid region; operation was recommended and refused. Dr. J. L. ADAMS thought that the use of the ice-coil might be responsible for the herpetic eruption.

Dr. C. J. KIPP asked for a discussion on the use of the ice-coil in the treatment of mastoiditis.

Discussion.— Dr. GRUENING has given up the use of the ice-coil as he believes that it simply masks the symptoms; hot applications are much better. Dr. J. L. ADAMS believes in the use of the ice-coil. He thinks that if it were not used we would do a great many unnecessary operations. Dr. BACON still uses the ice-coil but agrees with the opinion that when pus has formed its use is dangerous, especially in streptococcic infection. He has had very many fewer operations where the ice-coil has been judiciously used than with the use of hot applications. In simple cases of acute mastoiditis, he believes that the application of the Leiter coil is one of the best methods of treatment, especially after the drumhead has been freely incised. Dr. KIPP: Has the treatment been otherwise the same? Dr. BACON: The same. Dr. COWEN agrees with Dr. Bacon and believes in the intelligent use of the ice-coil for a limited time in the early stage, discontinued after thirty-six hours. Dr. GRUENING's experience had been diametrically opposed to that of Dr. Cowen. He favors the use of the hot bag. The ice-coil is unpleasant to the patient.

Dr. J. L. ADAMS wished to know what was Dr. Gruening's method of using the hot bag. Dr. GRUENING: A rubber bag is $\frac{3}{4}$ filled with boiling water; the bag is then covered with from two to four ordinary towels, outside of which is then wrapped a Turkish towel. As the bag grows cooler the towels are successively removed, the temperature of the application being thus fairly well maintained for a considerable time. Dr. BERENS believes in the use of heat but prefers the moist form as a rule. Dr. FRIDENBERG thought that the ice-coil stopped the inflammatory process in the more superficial parts and drove it into the deeper, more important parts; however, it is of use in some cases. Dr. GRUENING thought that the use of the ice-coil was dangerous and that of the hot bag was not. Dr. BACON thought that frequently the statements of hospital patients were unreliable as to the duration of the disease, and as it is most important to apply the Leiter coil in the very first stage

of inflammation, we were therefore more apt to get better results in private practice. He had treated a great many private patients with the Leiter coil and he had never known of a relapse in any of these cases.

Present.—Drs. Cowen, Kipp, H. Knapp, Bacon, Duane, Wilson, Berens, Marple, Quinlan, Clemens, Toeplitz, J. L. Adams, Whiting, Hepburn, May, Fridenberg, Gruening, Sheppard, Lewis, Alderton.

REPORT OF MEETING OF JANUARY 23, 1900.

Dr. J. L. ADAMS presented a patient on whom **exsection of the jugular vein had been done for thrombosis of the lateral sinus**; with specimen.

The operation took one and a half hours and the man made a very rapid recovery, developing only one unpleasant complication—pleurisy with effusion, necessitating the drawing out of ten ounces of serum from the chest. The vein was cut midway between the mastoid and the clavicle, pulled down, and dissected off.

Discussion.—Dr. MCKERNON asked if there was marked rapidity of the pulse and discoloration of the skin following the operation. He has noticed this rapidity of the pulse and marked blue discoloration of the skin over the side so operated upon. Dr. J. L. ADAMS: The pulse never went above 100. Dr. G. BACON was glad to hear the remarks of Dr. Adams with reference to the use of the hypodermic needle for exploratory purposes in sinus thrombosis. Dr. GRUENING called attention to the fact that the hypodermic needle was of no use in determining the presence of thrombus. Dr. Bacon advocates the free exposure of the sinus, then waiting twenty-four hours, and, if the symptoms do not abate, thorough opening of the sinus.

Dr. G. BACON presented a **microscopical section of the growth (sarcoma)** reported at the last meeting of the society as having been **removed from the external meatus**. Dr. WEEKS reported as follows: "The small tumor removed by you from the external auditory canal is a tumor of mesoblastic origin and belongs to the sarcomas. They are spoken of as alveolar sarcomas, also as endotheliomas, and endothelial sarcomas. Their malignancy is very slight." This opinion is concurred in by Drs. E. K. DUNHAM and GEO. SLOAN DIXON.

Dr. E. B. DENCH presented an **ear-trumpet**, consisting of a conical tube about twelve inches in length ; to the upper extremity of this is fixed a tip which can be removed, or can be turned at any angle, in order that it may be placed in the most advantageous position for any particular patient. The upper portion of this movable tip is bent at right angles to the elongated shaft. This instrument was first devised by Vallière of Paris. In Vallière's instruments the tube which served to collect the sound waves was made to take the place of the handle of an ordinary lorgnette. The lorgnette, however, could not be used while the tube was in the external auditory meatus. My own modification consists simply in so modifying the instrument, that the eye-glasses, either plain, or such as the patient wears, may be kept in position while the ear-trumpet is still in use. This, I think, is of no little value, as the attention is naturally turned to the eye rather than to the ear, and the presence of the apparatus used for the hearing is not noticed. The jointed arm which holds the eye-glasses can be removed ; the arm is flexible and can therefore be easily made to accommodate any patient. It goes without saying, that each instrument must be fitted, the same as in the case of eye-glasses, so that the patient may have no difficulty in bringing the instrument into the proper position. This device is made by John Reynders of this city, to whom I am indebted for the careful and conscientious work in the construction of the apparatus.

Dr. DENCH also presented a **tuning-fork stand**, designed to hold Bezold's continuous series of tuning-forks and whistles. It consists of a vertical shaft, about three and a half feet high, mounted on a triangular base. Upon this shaft are fixed three plates which hold the various forks. These revolve about the central shaft, so that any instrument can be removed at pleasure without disturbing the others. This applies not only to the forks but to the whistles and pipes as well. Bezold's series consists of fourteen tuning-forks, two closed pipes, and one whistle, also a hammer for setting the forks in vibration, and a thumb-wrench for changing the position of the clamps on the various forks. The desirability of the apparatus is : first, its compactness, as it occupies not more than eight inches of floor space, and, second, the readiness with which any particular fork can be found when desired. In this way it is quite as easy to make a complete examination with the Bezold series as to examine with only a few forks.

Discussion.—Dr. WHITING: What is the highest fork? Dr. DENCH: C⁵. Dr. WHITING: Is there a fork with 16 vibrations? Dr. DENCH: One with 15.

Dr. H. KNAPP showed the left half of brain with an abscess in the temporal lobe,¹ taken from a girl of twelve years, who had had otorrhœa from childhood, and an aggravation of her o. m. p. c. during the last four weeks of her life, with pain in head, nausea, and vomiting. December 17, 1899, at 6 P.M., she became unconscious and had violent convulsions for six hours. For the next two hours she was excited and screamed. Dr. K. saw her in consultation with the family physician December 18th at 1:30 P.M. She was frightened but rational. Little discharge in ear canal, no sagging of post.-upper wall, slight swelling and tenderness of mastoid. No optic neuritis; acuteness and field of vision normal but optical amnesic aphasia pronounced. Clinical diagnosis: *deep mastoid caries, epidural and cerebral abscess, with beginning meningitis.* Operation the same day at 6 P.M. Mastoid carious; cleansed. Posterior cranial fossa opened, dura mater and sigmoid sinus exposed; healthy. Posterior meatal wall chiselled away; attic filled with cholesteatoma; the carious and necrosed roof of attic removed. The dura of middle cranial fossa, laid bare about 2 cm in diameter, was but slightly thickened and red, not pulsating. In the posterior lower part was a round blackish patch of 3 to 4 mm in diameter, with a small perforation in the centre, through which a probe was introduced into the brain 4 to 5 cm up and inward, without meeting with any resistance, and without escape of pus or blood when withdrawn.

Dr. K., though not doubting the presence of an abscess in the temporal lobe, interrupted the operation, in order to await symptoms pointing more definitely to its location. The next two days the patient felt a great deal better, she talked fluently and rationally, and named correctly all objects held before her. In the third night she had headache and some vomiting, and during the day she failed to name several objects. Pulse had always been between 80 and 110, only in the last evening it sank to 60, temperature between 99° and 102°. The fourth night was good; in the afternoon of the fifth day she felt pretty well; chatted, had an appetite, no optic or other aphasia. Dr. K. and the family physician thought that the supplementary operation, *i. e.*, to expose and incise the brain from the fistula in the dura, should be done the next day. This was consented to.

The patient awoke at 9:45 P.M., shook and screamed for five minutes, and suddenly died.

The *autopsy*, made in the afternoon, revealed a very large abscess in the temporo-sphenoidal lobe, which had broken into the lateral ventricle. It had a dense capsule, was surrounded by softened

¹ Detailed description in this number of the ARCHIVES, No. 1, vol. xxix., p. 46.

brain substance. The left lateral and the third ventricle contained the same offensive, thin, and grumous pus which filled the abscess cavity.

Discussion.—Dr. BACON: The pus was not very thick? Dr. KNAPP: No, it was thin and grumous. Dr. BACON: In one of my cases the pus was very thick; it had to be washed out. Dr. H. KNAPP: The softened tissue explains the optic aphasia. Dr. GRUENING thought that where there is optic aphasia the abscess is generally posterior. Why did not Dr. Knapp aspirate? He thought aspiration was necessary. Dr. H. KNAPP acknowledged that the further course proved that the abscess should have been opened at the first operation. He would, however, have preferred incision. Aspiration was uncertain. Very few used the syringe now. Dr. KIPP: Dr. Macewen uses a blunt-pointed canula. Dr. DENCH thought that the knife was preferable. Valuable time is often wasted by using the aspirator or canula, and palpation is rendered possible by the use of the knife. Dr. GRUENING: Do I understand that Dr. Dench would enter the brain with the finger before he has found the abscess? Dr. DENCH: Yes, following a small incision with the knife. Dr. GRUENING thought that the aspirating needle should precede the knife. Dr. DENCH: Time is important and, therefore, is a reason for using the knife.

Dr. C. H. MAY presented a portion of a brain showing an **abscess in the temporo-sphenoidal lobe**. He gave the history of the case and described the operation. There was no change in the mastoid except eburnation. The attic was filled with pus and cholesteatoma. The abscess was successfully evacuated at the operation, but the patient died the following morning. The case was another instance in which the patient had presented herself for operation at a period which was too late to save life. A full report is given in this number of the ARCHIVES.

Discussion.—Dr. KIPP: Was there no discoloration of the dura; no continuous tract between the tegmen and the abscess? Dr. MAY: None. Dr. KIPP: Often when we first remove the brain the dura may not show any discoloration, but after having been kept in alcohol for a few days the discoloration manifests itself. Dr. J. L. ADAMS: Did I rightly understand Dr. May to say that he had usually found the pus from a brain abscess to be offensive? Dr. MAY: No; only often. Dr. BACON: Did Dr. May enter the antrum? Dr. MAY: No, for time was valuable and the diagnosis

pointed to abscess of the brain. Dr. BACON: In almost all these cases there is usually a small opening through the tegmen, often difficult to discover.

Dr. MCKERNON reported a case in which, after considerable searching, he found a sinus leading into the aditus.

Dr. GRUENING: I believe that there was in Dr. May's case a perforation of the tegmen. Dr. MAY: Yes, but no communication with the abscess. Dr. KIPP: Neurologists believe that otologists waste too much time in the preliminary operation; they think we should first open the abscess and then do the radical operation. Dr. J. L. ADAMS had seen two cases in which such was the procedure; in both there was a mistake in diagnosis, both being cases of sinus thrombosis. Dr. DENCH thought that we should make a very large opening in the skull, so as to expose all the regions it may be necessary to explore.

Dr. WHITING had a case two years ago, of subdural abscess following o. m. p. a., without perforation. No history; patient was comatose. He opened the skull quickly, so as to expose the tegmen of antrum, aditus, and tympanum. Could find no fistula. Aspirated the dura and found pus; the dura was then slit up, with the evacuation of more pus. Exploration of the brain with the knife was negative. Twenty-four hours later leptomeningitis developed, and death. At autopsy a fistulous tract was found.

Dr. ARNOLD H. KNAPP demonstrated the temporal bone of a man, thirty years old, who had died at one of the general hospitals in New York soon after admission. The sigmoid sinus contained a complete **parietal thrombus**; a part of the sigmoid groove and the adjacent dural wall of the sinus were diseased and covered with granulations; the mastoid antrum was very much enlarged and filled with cholesteatoma; a subdural abscess was situated on the posterior surface of the petrous pyramid, internal to the sinus. The ear had not been operated upon, and the man died from a septic pneumonia and acute empyema.

Dr. QUINLAN reported a **case of post-auricular abscess, with sudden death**. The classical mastoid operation was done and pus was found in the mastoid. The antrum was very large and filled with granulation tissue. Two hours after the operation the child suddenly died. There was no heart lesion. No autopsy was permitted.

Discussion.—Dr. FRIDENBERG: Was the fundus of the eye examined? Dr. QUINLAN: No.

Dr. GRUENING reported a case recently of a child, 5 years old, with a retro-auricular abscess. Usual operation. The dura was softened; fistula; brain abscess. Evacuated the abscess and saved the child. Dr. KIPP: Was ether or chloroform used? Dr. QUINLAN: Chloroform first and then ether. Dr. DENCH thought that these cases of sudden death are very frequently due to rupture of the abscess into the lateral ventricle. Dr. BERENS questioned whether an embolus might not have been responsible. Dr. DENCH: No such case has been reported. Dr. BERENS: We have it in general surgery. Dr. DENCH: Yes. Dr. WILSON: In a case of retro-auricular abscess he found the pus outside of the periosteum; none under the periosteum. Dr. DENCH: Perhaps this was a case of ordinary furuncular abscess. Thought that a post-auricular swelling was more indicative of furunculosis than of mastoiditis, except in infants. Dr. WHITING thought that the pus may have perforated the periosteum at the brim of the external auditory orifice.

Dr. GRUENING recalled the case of mastoiditis with herpes reported at the last meeting. The patient died of meningitis. Dr. SACHS examined the case and saw nothing indicative of meningitis; he did not know that herpes was a prodromic symptom of meningitis in such cases. The man did well at first; suddenly his temperature rose to 105° and he became unconscious. Operation: Opened sinus, negative; exposed dura, negative; explored cerebrum and cerebellum, negative. The man died. Autopsy: Basilar meningitis. The streptococcus was found in the otorrhœa, mastoid, and the meninges. This was the third case, complicated by herpes, seen by Dr. Gruening, all terminating fatally.

Present.—Drs. Clemens, Kipp, Berens, J. L. Adams, H. Knapp, A. H. Knapp, Whiting, Marple, Bacon, Duane, Wilson, Emerson, Fridenberg, McKernon, Hepburn, Gruening, Quinlan, Dench, May, and Alderton.

REPORT ON THE PROGRESS OF OTOLOGY DURING THE THIRD QUARTER OF THE YEAR 1899.

BY DR. A. HARTMANN.

Translated by Dr. ARNOLD H. KNAPP.

ANATOMY OF THE EAR.

193. PANSE, R. On the comparative anatomy and physiology of the organ of equilibrium and hearing. *Klin. Vortr. aus dem Gebiete der Otologie*, etc., 1899.

194. ALEXANDER, G. A case of persisting stapedial artery in man. *Monatschr. f. Ohrenheilk.*, No. 7, 1899.

195. V. STEIN, S. A new method of bone-corrosion specimens by means of hard rubber. *Anat. Anzeiger*, xv.

193. A review of the physiology of the various parts of the labyrinth based on comparative anatomy, experiments, and clinical observations, illustrated with drawings and tables. BRÜHL.

194. In a case of human double monster, a blood-vessel arose from the internal carotid, passing along a bony canal in the floor of the tympanum, from the promontory through the stapes to the roof, appearing at the base of the skull from a spurious canal terminating in a lateral branch, replacing the mid. mening. artery and a median branch anastomosing with the orbital vessels ending on the surface of the large sphenoidal wing. KILLIAN.

195. The injection material is the pink rubber used by dentists, which is soluble in chloroform. The soft mass becomes hard in a vulcanizing apparatus. The advantages of the method are cheapness, rapidity, lightness, and firmness of the specimens, and demonstration of the entire spiral lamina. HARTMANN.

PHYSIOLOGY OF THE EAR.

196. HAMMERSCHLAG. On the reflex movements of the tensor tympani and its central paths. *Sitzungsber. der Wien. Akad. math.-naturw. Cl.*, Bd., cviii., Abth. iii., p. 1.

197. OSTMANN. The function of the stapedius muscle in hearing. *Arch. f. Anat. und Physiol.*, p. 546, 1899.

198. ALT and BIEDL. Experimental investigations on cortical hearing. *Monatsch. f. Ohrenheilk.*, No. 9, 1899.

196. HAMMERSCHLAG tries to answer the following questions experimentally. Is the contraction of the tens. tympani in dogs, which has been observed by several investigators, a reflex passing through the auditory nerve, and originating in sound waves. If so, what kind is it, and what anatomical paths does it follow? The first question is answered affirmatively by the author's experiments. In addition to the tract between the eighth and fifth nerve nuclei on the same side, there is one between the eighth nerve nucleus of the one and the fifth motor nucleus of the other. Contractions of the tensor tympani occur after removal of the entire brain cortex, hence it is a pure reflex process. The path of this reflex was previously entirely unknown. Hammerschlag attempts to follow experimentally in the cat the path from the acoustic nucleus to the motor root of the fifth. The first part has been determined. The author believes this also to be the way of the tensor reflex in man.

BLOCH.

197. The acoustic action of a slight relaxation of the drum membrane is an increase of tone according to Helmholtz and others. Such a relaxation follows the contraction of the stapedius from Politzer's experiments. Sherrington and Hering have shown that a contraction of the stapedius does not cause contraction in the tensor tympani. The stapedius makes only a single spasm, not a continuous contraction. In the "Laucher," Gottstein found that the stapedius contracted when the other muscles supplied by the facial nerve contracted. OSTMANN says this is only momentary at the moment of attention and not a continuous, tetanic one. Ostmann found this momentary contraction to take place in a dog who showed a movement of his drum whenever a cat miawed in the same room.

BLOCH.

198. ALT and BIEDL destroyed one or both cochleæ in young dogs and compared their behavior to normal dogs. In other dogs the temporal lobes, or one temporal lobe and one cochlea,

were removed. The results showed that the destruction of the temporal lobe on either side was followed by reaction only to strong auditory impressions for the two first days; during this period the hearing power was especially weakened on the opposite side. On the ninth day the impairment had disappeared completely. Destruction of both cortical auditory centres caused deafness for ten to twelve days only, then a gradual recovery took place. A complete review of the literature is appended.

KILLIAN.

GENERAL.

a.—REPORTS AND GENERAL COMMUNICATIONS.

199. GRUNERT and ZERONI. Annual report of the university ear clinic in Halle-a.-S. from April 1, 1897, to March 31, 1898. *Arch. f. Ohrenheilk.*, vol. xlv., p. 153.

200. STEIN. Examination on the hearing organs of engine-drivers and on the hearing of acoustic signals. *Nordiskt Medicinskt Arkiv*, No. 8, 1899.

201. HECHT. Results of the examination of the deaf-mutes in the asylum at Ratibor. *Arch. f. Ohrenheilk.*, vol. xlvii., p. 57.

202. LANNOIS. Medico-legal examination of the ear of Vacher, the murderer. *Annal. des mal. de l'oreille*, etc., November 1, 1899.

199. In this report, prepared with the usual care, the authors again bring up the question of primary closure of the retro-auricular wound in the radical operation and again recommend the general leaving open of the wound. The persistent retro-auricular fistula is, however, not so much in use as formerly, as the flap in the membranous canal is carried out into the concha. During the dressing through the canal this opening is gradually enlarged by using large aural specula. BLOCH.

200. STEIN examined 44 stokers and 38 locomotive-drivers. Otoscopically 3 were normal. In the first group, 1-9 years of service, 33.2 per cent. were deaf; in the second, 10-19 years, 37.5 per cent., and in the third, 20-38 years, 61.11 per cent. In 11.73 per cent. of the examined ears disease of the sound-conducting apparatus, and in 48.33 per cent. disease of the perceiving apparatus was diagnosticated. While riding on an engine all could hear the acoustic signals under favorable conditions except the whistle. He believes that there should be a limit beyond which service of stoker or driver cannot be entered upon.

HARTMANN.

201. Of 286 inmates, 23 per cent. showed abnormal eyes ; of these 9 per cent. strabismus and 8 per cent. astigmatism. Of 103 born deaf, 35 per cent. had diseased eyes ; of these 12 per cent. strabismus, and 14 per cent. astigmatism. BLOCH.

202. LANNOIS examined the ears of the executed murderer Vacher. This man had shot a revolver bullet in his ear some time before his murders, and thereafter suffered from fœtid otorrhœa, loss of hearing, and facial paralysis on that side. The bullet was found imbedded in the inner wall of the tympanum. According to the author ear disease may cause epilepsy and attacks of mania. These cases are rare, and are always accompanied by transient aggravation of the ear trouble, which was not the case in Vacher, whose mental condition was uninfluenced thereby. SCHWENDT.

b.—GENERAL SYMPTOMATOLOGY AND PATHOLOGY.

203. WEIL. Scarlet fever and scarlatinal diphtheria in their relation to the ear. *Klinische Vorträge aus dem Gebiete der Otologie*, etc., vol. iii., p. 63.

204. DANZIGER. Can defects of the drum membrane cause sudden death in the bath? *Monatschr. f. Ohrenheilk.*, No. 9, 1899.

205. HAUG. A case of malignant tumor of the temporal bone with histological examination. Endothelial carcinoma with paralysis of recurrent and hypoglossal nerves, invading the cranium. *Arch. f. Ohrenheilk.*, vol. xlvii., p. 113.

206. NADOLECZNY, M. Endothelioma of the temporal bone. *Ibid.*, p. 126.

207. FRUITNIGHT, J. HENRY. Otitis of the exanthemata from the standpoint of the pediatrician and general practitioner. *Medical News*, July 1, 1899.

203. WEIL discusses the ear complications of scarlet fever chiefly with aid of the existing literature. He claims that this complication is present in 10 per cent. of the cases. Treatment is fully described. No mention is made of the not infrequent presence of diphtheria bacilli in the otorrhœa.

HARTMANN.

204. DANZIGER has observed a case of severe tinnitus from water entering the middle ear, which causes him to answer this question positively. KILLIAN.

205. Described in the title. BLOCH.

206. A sarcoma finally leading to death from meningitis.

BLOCH.

207. Of nearly five thousand cases of the exanthemata, especially scarlet fever and measles, the writer has met with otitis media as the most frequent complication. Of these patients, fully one third were victims of this particular complication. The frequency of the occurrence of otitis media was not in direct ratio to the severity of the general infection, for very often this complication was observed in cases of a very mild character. He urges the importance in every case of the eruptive fevers of watching the ears of the patients, and says that he has often cut short an attack, or at least mitigated its severity and preserved the patient's hearing, by at once treating this complication at its very commencement

GORHAM BACON.

C.—METHODS OF EXAMINATION AND TREATMENT.

208. LUCÆ. The physical determination of one-sided deafness. *Arch. f. Ohrenhkl.*, vol. xlvii., p. 101.

209. STUMPF. The determination of high numbers of vibrations by differential tones. *Ann. d. Phys. u. Chem.*, vol. lviii., p. 105.

210. BARATOUX. The unification of the measures of hearing. *La pratique médicale*.

211. BOMRIER. Hearing tests. *Rapport du Congrès d' Otologie*, May 1, 1899.

212. BARTH. The percussion of the mastoid process. *Arch. f. Ohrenhkl.*, vol. xlvii., p. 107.

213. OBRASZOFF. A case of eclampsia following incision of the drum membrane. *Monatschr. f. Ohrenhkl.*, No. 7, 1899.

214. BURNETT, C. H. Pneumo-massage of the external auditory canal compared with inflation of the tympanum. *University Med. Magazine*, Aug., 1899.

208. LUCÆ employs a T-shaped tube, of which one branch is connected by a 3-cm-long piece of rubber tubing to the ear to be tested for deafness. In the opposite branch, tuning-fork A is fastened. From the long extremity, tubing 50 cm long goes to the healthy ear. In the latter the tone of the fork is heard louder when the short tube is connected with the deaf ear than when it is open. If both ears are good, a momentary increase in tone is

heard in the nearer ear, followed by an even tone heard in both. The test is only applicable for the tone used in the examination.

BLOCH.

209. STUMPF's paper follows the one which showed that the pitch of Appun's high organ pipes was incorrect. A number of these pipes between c^5 and c^6 were examined by the differential method; the c^5 pipe alone was correct, while the higher ones up to c^6 were much too low; all are situated in one and the same octave, instead of in three. The method to measure high places of the scale by the observation of definite difference tones arising in definite intervals is comparatively simple and reliable.

BLOCH.

210. BARATOUX is in favor of the German method of double counting of the tuning-fork vibrations, and for the general use of Bezold's forks and the determination of the hearing acuity according to suitable proportions.

BRÜHL.

211. The usual hearing tests with tuning-forks are described with preliminary physiological remarks, in which Helmholtz's theory is given up. "Paracousie de Weber" is an experiment where the fork placed on the knee is heard in the ear in disturbances of the sound-conducting apparatus.

BRÜHL.

212. BARTH considers percussion of the mastoid to be without value. In a case of normal drum and hearing, the right mastoid was opened, because patient complained of an enlargement of the same. The mastoid gland was enlarged, the process was normal.

BLOCH.

213. During paracentesis on account of acute otitis media, general muscular contractions, coma, dilatation of pupils, set in. The patient was a man, thirty-two years of age.

KILLIAN.

214. In a paper, read by title, at the meeting of the American Otological Society, in July, 1899, BURNETT draws the following conclusions:

Pneumo-massage applied to the external auditory canal and membrana tympani, and immediately to the ossicles of hearing, in both acute and chronic catarrhal processes in the middle ear, is more efficient, less of a shock to the auditory nerve, more agreeable to the patient than inflation, and entirely free from sepsis, whereas inflation is not. Inflation of the tympana being very rarely necessary as a means of forcing air into the middle ears, the latter being very seldom in need of it, it is fair to

conclude that inflation of the tympana, as it must be applied to both ears, whether desired or not, is usually contra-indicated in aural diseases.

On the other hand, as drawing the membrana tympani and malleus outward, and traction on the tensor tympani, and restoration of the normal isolation of the auditory ossicles are desired, without any shock to the structures upon the inner wall of the drum cavity, and as this can be so safely effected by pneumatic rarefaction of the air in the auditory canal, pneumo-massage is indicated for this purpose. In fact, some form of pneumo-massage of the external ear has almost entirely superseded the use of all forms of inflation of the tympanum in my hands, during the past ten years.

GORHAM BACON.

EXTERNAL EAR.

215. LAUBINGER. On othæmatoma and perichondritis. *Arch. f. Ohrenhkl.*, vol. xlvii., p. 135.

216. SPIRA. On artificial, mechanical, and organic closure of the dry perforation of the drum. *Przegląd Lekarski*, Nos. 27-29, 1899.

217. POWELL, A. Keloid nature of the "fibrous" tumors of the auricle. *Indian Med. Gazette*, August, 1899.

218. CARROLL, J. J. Compound comminuted fracture of the osseous wall of the external auditory canal. *Four. of Eye, Ear, and Throat Diseases*, July, 1899.

215. In two butcher boys, a serous or sero-bloody extravasate took place in the right auricle, which disappeared after treatment. A history of traumatism is present, but so slight that no hemorrhage occurred. In addition, three cases of perichondritis are described with thickening of the auricle after trauma and coagulation.

BLOCH.

216. SPIRA recommends the treatment of dry perforations, with 10-60 per cent. trichloracetic acid.

POLLAK.

217. POWELL thinks that the keloid nature of these tumors is proved by :

(1) Their histology.

(2) Their origin in a scar.

(3) Their recurrence after excision.

(4) Their greater frequency in dark races.

(5) Frequent co-existence of keloid on other scars in the same patient.

ARTHUR CHEATLE.

218. The patient, aged thirty-two, was thrown from a wagon and fell upon a granite block pavement on his chin. There was immediate hemorrhage from the ear, with pain, and a feeling of fulness. The two lower canine teeth were chipped, and in the external meatus, about 2 *cm* from the tragus on the anterior inferior wall, there was a reddish and hard elevation, extending directly upwards to within 4 or 5 *mm* of the superior wall, backwards to the posterior wall and barely touching it. The bone was denuded. Conjointly with the opening and closing of the mouth, the elevation in the canal moved back and forth. The hearing was but slightly affected. GORHAM BACON.

MIDDLE EAR.

a.—ACUTE OTITIS.

219. LEUTERT. Bacteriologic and clinical studies on the complications of acute and chronic purulent otitis media. *Arch. f. Ohrenheilk.*, vol. xlv., p. 190, and vol. xlvii., p. 1.

220. PASSOW. The treatment of acute otitis media; the treatment of chronic exsudative otitis media. *Die Therapie der Gegenwart*, July and Sept., 1899.

221. DELSTANCHE. The importance of the ophthalmoscopic examination in purulent ear-disease. *Bull. de la soc. belge d'ot.*, Brussels, 1899.

222. BLAKELY, D. N. Acute middle-ear inflammation as a complication of scarlet fever and measles. *Arch. f. Pediatrics*, July, 1899.

219. In this excellent historical and critical review, LEUTERT defines the present position of the bacteriology of the middle ear. The author's own bacteriological examinations in acute and chronic mastoid empyema, epidural abscess, periauricular abscess, brain abscess, and sinus thrombosis are described.

In mastoid empyema after acute otitis Leutert found in 62 cases, 38 times streptococcus in pure culture, 11 times pneumococcus, 5 times staphylococcus albus, and twice pure tuberculosis. In epidural abscess after acute purulent otitis, of which 10 cases were examined, 6 times pure pneumococcus was found, and twice streptococcus. In three cases of acute empyema with sinus thrombosis, pure streptococcus was found present three times. In four cases of auricular perichondritis, the bacillus pyocyaneus was alone present in pure culture.

Leutert, just as other authors, regards the pneumococcus as clinically a rather benign microbe ; as the middle-ear trouble more rapidly resolves, the destruction in mastoid involvement is less extensive, and the temperature more rarely and not so much affected, and the operative cases heal more quickly. The comparatively frequent epidural abscess in pneumococcus infection (circumscribed purulent collections connecting with the middle ear by a narrow fistula), seven in ten cases, Leutert explains by the slight destructive agency of this suppuration. In streptococcus infections the bony tissue is more quickly disintegrated, and a freer communication exists between the focus in the cranial cavity and the primary focus. The pneumococcus suppuration in the middle ear and even in the mastoid may have ceased at the time when the symptoms of the epidural abscess appear.

The relative benignancy of the pneumococci may be explained because they usually start up the aural suppuration when in an attenuated condition, as Maggiora and Gradenigo and Herzog have shown.

Leutert agrees with Netter that the sinus thrombosis is exclusively caused by the streptococcus. In brain abscess this same microbe was found four out of seven times, but only once in pure culture. It was also present in scarlatinal suppuration, though Leutert believes secondarily.

Aural suppurations become chronic, according to Lermoyez, Helme, and Leutert, to the pyogenic staphylococcus, especially the staph. alb., and to saprophytes. Opposed to these authors, Leutert believes the exacerbations and relapses to follow from the naso-pharynx more than the aural canal, and naso-pharyngeal catarrh, adenoids, and others should be treated prophylactically against chronic otitis. It has been known for some time that the staphylococci keep up chronic suppuration ; they replace the agent of the acute inflammation.

It is noteworthy that the bacillus pyocyaneus was found in pure culture in the four cases of perichondritis ; Leutert is inclined to consider it the sole cause.

In a short clinical part, Leutert repeats the facts that pneumococcus inflammations cease rapidly, and that after weeks, when the otorrhœa has ceased, the mastoid or epidural suppurations may begin. If pneumococci are found in the discharge in these regions, the suppuration may be assumed to be acute in other uncertain conditions. The original otitis may even remain

unrecognized, thus mastoiditis would be regarded as primary. These primary mastoid affections are questionable according to the author.

BLOCH.

220. In these two papers PASSOW, after remarks on the pathology, discusses the treatment for the purposes of the general practitioner. The importance of ear disease is sufficiently emphasized, especially the influence of chronic suppuration on the rest of the organism.

BLOCH.

221. After a review of the special literature the author gives the results of ophthalmoscopic examination in fifteen cases of purulent otitis media without endocranial complication. The results were negative, hence author believes that neuritis optica must be very rare in absence of endocranial complication.

BRÜHL.

222. According to the statistics of BLAKELY, 22 per cent. of the scarlet-fever patients and 45 per cent. of the measles patients had an ear complication. Of 649 patients, 86 had acute middle-ear inflammation. His conclusions are as follows :

1. Acute middle-ear inflammation occurs a little oftener in measles than in scarlet fever.
2. In scarlet fever, though a frequent complication in children, it is rare in adults.
3. In measles, though more frequent in children than in adults, it is by no means uncommon in the latter.
4. It may begin at any time in the course of the disease.
5. All grades of severity are met with.
6. Early treatment tends to shorten the course of the inflammatory process.
7. So far as danger to life is concerned it is not a serious complication.

GORHAM BACON.

b.—CHRONIC PURULENT OTITIS.

223. STEBBER. The conservative treatment of chronic purulent otitis. *Berl. klin. Wochenschr.*, Nos. 37 and 38, 1899.

224. VACHER. Treatment of acute and chronic suppurative otitis with formol. *Annal. des malad. de l'oreille*, etc., No. 1, 1899.

225. SOMERS, L. S. Xeroform in chronic purulent otitis. *Wien. med. Presse*, No. 39, 1899.

226. LUCAE. On carious and traumatic lesions of the labyrinth with especial regard to the symptoms of vertigo and absence

of Weber's test ; a few technical remarks on the so-called radical operation. *Arch. f. Ohrenhkl.*, vol. xlvii., p. 85.

227. HAAG. A case of necrosis of the cochlea. *Ibid.*, p. 125.

228. GOLDSTEIN. Modern therapy of the tympanic cavity. *N. Y. Med. Journ.*, July 29, 1899.

223. The means of avoiding the radical operation, according to this author, consist in the instillation of 2-per-cent. solution of iodine-potassium iodide with addition of lipsol ; introduction of chinolin-naphthol gauze tampons ; irrigations of menthoxol solution in fetid otorrhœa ; granulations to be removed with the snare or trichlor-acetic acid. The treatment is applicable " only in cases where no symptoms of mastoid involvement are present." An operation appears to be indicated in all these cases to the author " though the necessity of always exposing the mastoid antrum is still undecided, as with Wilde's incision I have been able to cure the otorrhœa in a number of patients with chronic purulent otitis and mastoid periostitis." (!) MÜLLER.

224. Formol, undiluted, is very painful to mucous membrane. The author employs a 5-10 per cent. solution in which the gauze for the ear is soaked. The remedy is applied daily after cleansing, caution being had lest any of the liquid should enter the pharynx. VACHER has obtained excellent results with it. SCHWENDT.

225. The ear canal and the middle ear are cleansed with hydrogen peroxide and cotton tips after removal of all granulations ; the xeroform powder is lightly dusted on and a gauze drain is introduced, the ear covered by a pad of cotton for one to two days. SOMERS succeeded in curing or improving cases where other methods had failed. POLLAK.

226. LUCÆ describes fifty cases of carious lesions of the labyrinth, almost always at the horizontal canal. Vertigo was present in 60 per cent. of the cases, together with nystagmus in 22 per cent. The author warns against the one-sided opinion that vertigo in otorrhœa is always due to this lesion. Weber's test he considers of no differential value in diagnosis. BLOCH.

227. Right chronic otorrhœa with pain, vomiting, and loss of hearing. Radical operation. Caries of the outer wall of attic, at the aditus, hammer, and anvil and at a place above promontorium. Subsequently carious stapes and entire cochlea were exfoliated. No facial paralysis. BLOCH.

228. GOLDSTEIN believes that the otologist of the present day is inclined to institute radical operative measures for the cure of suppurative diseases of the middle ear where a more conservative treatment is indicated. He is opposed to the frequent use of the syringe in suppurative cases where the perforation is large, for fear of disseminating infectious material into remote and healthy areas. He also thinks that too frequent syringing favors granulation and polypus formation, and is opposed to the use of the middle-ear syringe except in cases of mild cholesteatoma. In chronic suppurative otitis media, where no pain or discomfort exists, he uses the Eustachian catheter in connection with a nebulizing or vaporizing apparatus. He prefers nosophen to the other powders. Where the discharge is profuse he adds to the treatment packing of sterilized gauze.

GORHAM BACON.

C.—CEREBRAL COMPLICATIONS.

229. SCHÖNGUT. A case of otitic sinus thrombosis; operation; recovery. *Wien. med. Wochenschr.*, No. 33, 1889.

230. PHELPS, CHARLES. Otitis media; cerebral abscess. *N. Y. Med. Jour.*, July 8, 1899.

231. MAYNARD, F. P. Cerebellar abscess, trephining; death. *Indian Med. Gazette*, August, 1899.

232. BACON, GORHAM. On the importance of an operation in the first stage of thrombosis of the sigmoid sinus (following acute purulent otitis media), with a report of three cases. *N. Y. Med Jour.*, July 1, 1899.

233. YOUNG, ARCHIBALD. Remarks upon the operative treatment of infective thrombosis of the sigmoid sinus following chronic purulent otitis media. Record of a case successfully treated. *The Glasgow Med. Jour.*, October, 1899.

229. Bilateral acute otitis. Paracentesis on fifth day. Rigors continue from the third day. On the eighth day pain in the head, especially in occiput, back and sides of neck tender. Ophthalmoscope revealed venous congestion in right eye. The right jugular felt cold-like to the clavicle, and diagnosis of sinus thrombosis was made. The antrum was exposed on the following day, the sinus laid bare and incised, a few drops of dark blood were evacuated. The sinus was thrombosed above and below as detected by the probe. No further rigors; healed in four weeks.

POLLAK.

230. The patient was a young man, twenty-five years of age, who had had otitis media for some time. He was taken suddenly ill and had lost consciousness almost immediately. A diagnosis at this time was made of meningitis from infection through the petrous portion of the temporal bone. No operation was performed at this time. After a time symptoms of cerebral abscess developed, and among these was descending neuritis. PHELPS then trephined over the ear and found nothing, so the operation was abandoned. The patient died about four weeks later. At the autopsy it was ascertained that there had been an acute purulent meningitis involving the lower surface of the cerebellum and the anterior surface of the pons, and extending into the spinal canal. The path of infection had been through the tympanic roof and choroid plexus into the opposite lateral ventricle.

GORHAM BACON.

231. A sailor, aged eighteen, came under MAYNARD'S care on August 1, 1899, with a history of three days' fever.

Temp. 40.5° , severe general headache, much lassitude, constipation of two days' duration, vomiting once on each of the previous days, moist, thickly coated tongue, good appetite.

A discharge from the left ear had been present for some time. No swelling or tenderness behind the ear.

Pupils normal when exposed to the light, but when shaded the left was a little smaller.

On August 3d some shivering, temp. 40.5° ; August 4th the headache went, and the temp. fell from 41.4° to 37.2° ; August 5th and 6th seemed better. On the evening of August 7th some giddiness and headache. On the 9th his pulse fell to 60, the temp. rose to 38.6° , and he became unconscious; the right pupil being larger than the left, neither responding to light. The muscles of the neck were rigid, and those of the right arm slightly so. The breathing became stertorous and then Cheyne-Stokes in character. Operation was undertaken, a drop of pus being found in the antrum. None was found in the cerebrum or cerebellum, although both were explored with a hypodermic needle.

Post-mortem.—An abscess the size of a tangerine orange was found in the front of the left cerebellar hemisphere, and must have been entered by the needle. The lateral sinus contained fibrinous clots. The mastoid process was sclerosed.

ARTHUR CHEATLE.

232. In the three cases reported, the complications, viz.,

mastoid disease and thrombosis of the sigmoid sinus, followed acute purulent otitis media.

The first case was a boy, seven years of age, who had an earache due to cold and tonsillitis. In spite of the treatment, which consisted in the use of the artificial leech, the Leiter coil, and a free incision in the drumhead, the inflammation extended from the mastoid cells to the sigmoid sinus. The sinus was opened just one week after the commencement of the earache and a soft thrombus was removed.

In Case 2 ten days elapsed between the first symptom of earache and the operation on the sigmoid sinus, while in Case 3, eleven days after the beginning of the attack, a broken-down thrombus was removed, showing that in eleven days' time after the first symptom of earache pus may be found in the sigmoid sinus. The conclusions are as follows :

1. The impropriety of giving antipyretics in all cases of suppurative otitis media.
2. The value of a bacteriological examination of the secretion from the external auditory canal in all cases of suppurative otitis media.
3. The importance of operating at the earliest possible stage after a diagnosis of thrombosis has been made.
4. The use of the normal saline solution during the operation for sinus thrombosis or immediately following it.

233. The case was that of a child aged two and a half years. The sinus, being found locally thrombosed where it bends downwards and inwards towards the jugular fossa and bulb, was opened for about three quarters of an inch and a quantity of foetid, dark-grayish, partly disintegrated clot was removed, and a strip of iodoform gauze inserted. No attempt was made to remove the whole thrombus. The jugular vein was not tied. Recovery.

ARTHUR CHEATLE.

d.—OTHER AFFECTIONS.

234. HAIKE. Foreign bodies of unusual imbibition lodged in the tympanum in chronic purulent otitis. *Deutsche med. Wochenschrift*, No. 27, 1899.

235. BREITUNG. Treatment of chronic progressive deafness with frequent vibratory massage of the drum with the electromotor. *Monatschr. f. Ohrenheilk.*, No. 8, 1899.

236. JALDA. Atresia of the Eustachian tube. *Wiener med Wochenschr.*, Nos. 25, 26, 1899.

237. STUCKY, J. A. Fracture of base of skull, with deafness, tinnitus, vertigo, exophthalmos, facial paralysis, mastoiditis; operation; recovery. *Louisville Monthly Jour. of Med. and Surg.*, Aug., 1899.

234. A black, firm foreign body was found at the depth of the ear canal in a girl æt. ten, with otorrhœa, and was taken for a sequestrum. At the radical operation the foreign body lodged in the hypotympanic recess; was extracted and proved to be cinnamon by odor and later microscopically. This substance must have swollen from the starch granules it contained to reach its present size.

NOLTENIUS.

235. BREITUNG gradually increases and diminishes the force of the massage. Injection of the hammer neck is a sign to stop. This massage is advised for cases of sclerosis and especially for the subjective noises. The author has had good results.

KILLIAN.

236. A girl of sixteen, complained of tinnitus and slight deafness referable to the middle ear. On examination: *Mt* very transparent, pearl gray, slightly retracted; pharyngeal end of tube flattened, grayish red, and smaller. Catheter can surely be made to enter tube, but no air can be forced in; a tubal bougie stops 2-3 mm beyond tip of catheter and meets a firm tissue. Siegle's speculum permits only slight mobility of the drum. The aural manometer shows no change on catheterization or Politzeration. According to the author, the slight changes in the drum and hearing can be explained by the possibility of air ventilation through the drum and the tube.

POLLAK.

237. The patient, a jockey, was violently thrown from his horse, striking his head. When he recovered consciousness, he complained of great noise in the right ear with some deafness. No hemorrhage from the nose or ear. A week later the deafness became very marked and he complained of great tinnitus and vertigo. There was also facial paralysis on the same side. Also exophthalmos of the right eye with several hemorrhagic spots in the deep conjunctiva and some dimness of vision. Temperature 101° F.; pulse 72. The auditory canal was red and swollen with a bulging of the posterior superior wall. The membrana tympani was lacerated in the upper segment. The middle ear was filled with clotted blood and the mastoid was tender. A Schwartze-Stacke

operation was performed and the antrum and cells were found filled with adherent blood-clots. The malleus and incus were hanging loosely. The mastoid wound was treated in the usual way after all the clots had been removed. The patient made a good recovery.

GORHAM BACON.

NERVOUS APPARATUS.

238. STEIN, V. Lesions of the labyrinth. *Kop. Tid.*, No. 30, 1899.

239. BONNIER. Labyrinthine tabes. *Nouvelle iconographique de la Salpêtrière*.

238. A short description of the pure labyrinthine cases observed at the Copenhagen clinic during the year 1898. The diagnosis was usually made with aid of Bezold's continuous tone series. The treatment consisted in pilocarpine injected subcutaneously 1 cg, four times a week. Hearing was not thereby restored, but subjective noises and vertigo were usually improved.

STEIN.

239. As numerous symptoms of tabes can be explained better as an affection of the labyrinth rather than of the spinal cord, and as certain symptoms occur frequently in labyrinthine lesions without tabes dorsalis—Romberg's symptom, nystagmus, strabismus, diplopia, etc.—BONNIER, from anatomical, physiological, pathological, and clinical data, has described a tabes labyrinthica.

BRUHL.

NOSE AND NASO-PHARYNX.

a.—GENERAL PATHOLOGY.

240. MORITZ and RÖPKE. On the health of metal workers about Solingen. *Zeitschr. f. Hygiene u. Infectiousk.*, vol. xxxi., p. 231.

241. SCHEIER. Post-mortem examination of the naso-pharynx. *Virchow's Archiv*, vol. 157.

242. LÖWENBERG. A pathogenic sarcina. *Annales de l'Inst. Pasteur*, April, 1899.

240. This paper, chiefly of hygienic interest, presents some points of importance for the specialist. As a result of the great quantity of metallic and stone dust inspired, an atrophic condition of the mucous membrane of the nose, pharynx, and larynx was found present, accompanied by a degree of anæsthesia in many

of the workmen examined. 48.2 % of those examined, suffered from chronic irritation of the larynx, 12 % from pulmonary affections. The following can be taken as a proof for the importance of nasal respiration : sharpeners with obstructed nasal respiration are more disposed to lung trouble than those with normal noses.

In 1885-1895, 72.5 % of all metal sharpeners succumbed to pulmonary tuberculosis, while of the remaining male population the mortality of consumption was only 35.3 %. RÖPKE.

242. LÖWENBERG demonstrated in 1884 that the fœtor in ozæna was caused by the microbe described by him ; recently he has discovered that the fœtor may rarely be caused by other bacteria. In one of the cases a new sarcina was found, pathogenic for animals. The nasal mucus in this case was composed of multi-nuclear leucocytes and enormous packets of this sarcina.

HARTMANN.

b.—METHODS OF EXAMINATION AND TREATMENT.

243. BAUMGARTEN. Natro-sulphocirinate of phenol in rhinolaryngology. *Wien. klin. Wochenschr.*, No. 39, 1899.

244. FARLOW, J. W. An adjustable nasal splint. *N. Y. Med. Fourn.*, Sept. 9, 1899.

245. ARMSTRONG, HERMANN L. A nasal enchondromatome. *N. Y. Med. Fourn.*, July 8, 1899.

243. This remedy, useless in acute and chronic rhinitis and hypertrophies, has been of some value in atrophic rhinitis with and without ozæna. It is used in a 30 % solution and applied 2-3 times locally to the mucous membrane. POLLAK.

244. The splints consist of two nearly flat pieces of perforated silver with an oval spring of composite metal between them, through which runs a small rod headed at one end and supplied with thread and nut at the other. By turning the nut with the key the blades of the splint may be separated to any desired width. M. TOEPLITZ.

245. A bent bone-cutting forceps to take the place of the saw in operations under general anæsthesia, which is necessary for its application. M. TOEPLITZ.

c.—EPISTAXIS.

246. RANGE, P. Epistaxis and its treatment. *Wien. med. Blätter*, No. 33, 1899.

247. NATIER, M. Recurring spontaneous epistaxis; five cases. *La parole*, No. 8, 1899.

248. KOMPE. Epistaxis as an early symptom of cerebral softening, and the relation of both affections to arterio-sclerosis. *Arch. f. Laryng.*, ix.

249. MANNASSEH, A. J. A case of epistaxis due to a leech. *Lancet*, Sept. 16, 1899.

246. The bleeding point is usually circumscribed at the lower and anterior part of the septum, or it may be situated in any part or even be diffuse. Treatment consists in tamponade, gauze impregnated with gelatinized serum, a solution of gelatine 5-10 % in artificial serum (sodium chloride 7 %).

POLLAK.

247. A complete description of 5 cases of spontaneous hemorrhage from the nose, without any features.

HARTMANN.

248. Spontaneous hemorrhage in older persons is always suspicious of arterio-sclerosis, even though the peripheric vessels appear normal. If changes in the intellect or in the psychic condition are also present, commencing brain softening must be thought of. KOMPE describes five cases but does not state the rhinoscopic condition. Potassium iodide seemed to be of value.

ZARNIKO.

249. A young child was brought to MANNASSEH of Beyrout on account of epistaxis. On looking into the mouth the end of a leech was seen below the soft palate, being evidently attached to some part of the posterior nares.

The bleeding ceased on removal.

The leech was supposed to have been conveyed by drinking from a spring.

ARTHUR CHEATLE.

d.—TUMORS OF THE NOSE.

250. HOPMANN. On the operation of the hard fibroma at the base of the brain without preliminary operation; remarks on certain disturbances of speech. *Münch. med. Wochensch.*, No. 32, 1899.

251. COSTON, H. R. A nasal polypus of unusual size, springing from the nasal septum of a child of twelve years. *N. Y. Med. Fourn.*, Aug. 5, 1899.

250. In a girl, twelve years old, the lower part of a nasal polyp projected half an inch below the soft palate. Both nasal passages

were obstructed by the polyp, which occupied the naso-pharynx. The tumor was drawn down by a hook and finally removed by the finger introduced in the naso-pharynx. The tumor was attached to the nasal septum by a broad base, and had a nasal and two pharyngeal prolongations. It measured $3\frac{1}{4}$ inches in length, $1\frac{1}{4}$ inches in breadth, and $\frac{7}{8}$ inch in thickness, and weighed one ounce. It was almost a pure myxoma. The four polypi had one common pedicle. TOEPLITZ.

251. This was a case of fibroma of the base of the skull, weighing seventy-six gr., in a boy eleven years old. All consonants, especially the sibilant sounds, were imperfectly pronounced on account of the large cavity remaining after the operation. This was immediately relieved by plugging the nose. SCHEIBE.

c.—ACCESSORY CAVITIES.

252. LAURENT. The development of the accessory cavities; demonstration. *Bull. de la société Belge d'otologie*, 1899, p. 51.

253. VEIS, J. Empyema of the accessory cavities of the nose; their importance for the general practitioner. *Wien. klin. Rundschau*, Nos. 36 and 37, 1899.

254. CLINÉ. Diseases of the maxillary antrum. *Four. Amer. Med. Ass.*, Sept. 23, 1899.

255. SCHLAGENHAUFER. A case of cystic degeneration of the nasal mucous membranes and the accessory cavities. *Wiener klin. Wochenschr.*, No. 35, 1899.

256. SPIESS, G. Sequestrum in the alveolar process after perforation of the maxillary antrum. *Arch. f. Laryngol.*, ix.

257. SPIESS, G. Endonasal surgery of the frontal sinus. *Arch. f. Laryngol.*, ix.

252. The mastoid antrum is present in the fœtus of six months, the ethmoid cells in the seventh month, the maxillary antrum at birth, the frontal sinus in the second year, the sphenoidal sinus in the eighth year. BRÜHL.

253. VEIS describes the symptoms of accessory-sinus disease. His experience as to curability and prognosis is as follows: The cure of the suppuration is attained relatively seldom, and then only after months of treatment; all progress may be lost by a simple coryza.

254. CLINÉ's 150 cases occurred between the ages of 20 and 70; 48 in females, 102 in males. Of 140 cases of his own observation,

6 were sarcomatous; 50 per cent. of the cases were of dental origin, 40 per cent. were due to dental caries and influenza combined, and 10 per cent. to ethmoiditis and various nasal obstructions; 20 cases were acute, 120 chronic, of from 2 months' to 7 years' standing. In 16 cases, œdematous swelling of the mucous membrane; in none, polypoid growth was found; 5 cases were bilateral, 75 per cent. on the right side. For diagnosis, peroxide of hydrogen into the ostium maxillare and the position of the head, and in cases with deflected septum H_2O_2 through an exploratory puncture was used. The antrum was opened through the alveolar root.

M. TOEPLITZ.

255. SCHLAGENHAUFER describes a case of cystic degeneration of the nasal mucous membrane, of both maxillary antra, of the sphenoid and ethmoid cells. This caused a fatal purulent meningitis. The cysts in the sphenoidal mucosa occluded the sphenoidal opening and caused a subsequent dilatation of the sphenoidal cavity. As regards the glands of the nasal mucous membrane, the author finds them to be partly mixed glandular structures, producing mucus and serum in equal quantities.

POLLAK.

256. After perforating the antrum through the alveolar process, great tenderness persisted in irrigating. Four months later, a sequestrum became loose, which completely surrounded the perforation. SPIESS believes that the bone necrosed from overheating from a rapidly revolving drill. He recommends a drill with a thin shaft.

ZARNIKO.

257. SPIESS follows the method of Schäffer for entering the frontal sinus, with the following exceptions: 1, he uses an electromotor trephine instead of a probe; 2, verifies the course of the instrument by a radiograph. He has practised this method in eight cases. It is necessary to guard against the drill not slipping, which occurred in one case and the drill appeared externally next to the eye. Otherwise there is no danger.

ZARNIKO.

f.—OTHER AFFECTIONS.

258. REUTER. Neuritis olfactoria (Diseases of the olfactory ganglion). *Arch. f. Laryngol.*, ix.

259. BÖNNINGHANS. The correction of marked deflections of the cartilaginous and bony septum. *Arch. f. Laryngol.*, ix.

260. OSTMANN. The removal of posterior hypertrophies of the inferior turbinates. *Arch. f. Laryngol.*, ix.

261. KENG, L. B. A peculiar case of nasal obstruction. *The Scottish Med. and Surg. Jour.*, Oct., 1899.

258. Neuritis olfactoria is caused by injuries to the first neuron, the region from the olfactory cell to the glomeruli of the olfactory bulb. It is characterized by: 1. Extensive anosmia not accounted for by the rhinoscopic condition. 2. The various classes of odors are unequally affected as opposed to respiratory anosmia. 3. Changing character of the anosmia. 4. Unusually rapid exhaustion of the sense with consequent lack of delicacy of smell, bad smells causing a less disagreeable sensation. REUTER describes this neuritis olfactoria in influenza, tabes dorsalis, the various intoxications (tobacco, cocaine, etc.), in over-stimulation of the olfactory nerve from strong sensations of smell, in pigment atrophy of the olfactory region; finally, the congenital senile anosmia, injuries of the olfactory ganglion, and basal diseases.

ZARNIKO.

259. BÖNNINGHANS has extended Krieg's resection (excision of a piece of cartilage and mucous membrane from the convex side) for the deviated septum by removing also the deviated bone lying behind. He describes his excellent results in nineteen cases, and gives an exact description of the operation and after-treatment with excellent critical remarks on the indications and chances for success.

ZARNIKO.

260. OSTMANN has difficulty in applying the snare about the posterior hypertrophies in some cases, and there has been troublesome hemorrhage. He advises to draw one or two furrows with the galvano-caustic wire along the posterior and lower edge of the turbinal; the half-divided piece can then be removed without hemorrhage with the cold snare.

ZARNIKO.

261. A Japanese workman was brought to KENG on account of nasal obstruction and weakness. Three months previously, while bathing, he felt something slipping into one of his nostrils.

In a few days he discovered that when he bathed, something smooth, velvety, and cool crept down the left nostril. By applying some fresh water to the nose he could induce the leech to elongate itself and move about in the water.

On examination, the nose was slightly swollen on the left side, and on looking into the nose a black mass could be seen projecting from the superior meatus.

After a few drops of chloroform had been inhaled by the patient through the nostril, the leech was easily removed by means of forceps.

ARTHUR CHEATLE.

SOFT PALATE, PHARYNX, AND BUCCAL CAVITY.

262. SÄNGER. Perverse action of the soft palate. *Wien. klin. Rundschau*, No. 32, 1899.
263. KRONENBERG. Angina and acute articular rheumatism. *Münch. med. Wochenschr.*, No. 27, 1899.
264. ONODI. Lipoma of the tonsil. *Arch. f. Laryngol.*, ix.
265. MERX. A case of chronic urticaria of the throat. *Münch. med. Wochenschr.*, No. 36, 1899.
266. STUCKY, J. A. Removal of tonsil and adenoids, followed by fatal result. *Annals of Otol., Rhinol., and Laryngol.*, May, 1899.
267. COULTER, J. HOMER. Observations on tonsillotomy. *Four. Amer. Med. Assoc.*, Sept. 23, 1899.
268. RAY, MORRISON. A case of sarcoma of the tonsil. *Med. News*, Sept. 2, 1899.
269. SCHADLE, JACOB A. Accessory thyroid tumors at base of tongue. *Four. Amer. Med. Assoc.*, Aug. 12, 1899.
270. THEISEN, CLEMENS F. Tuberculosis of pharynx. *Four. Amer. Med. Assoc.*, Aug. 12, 1899.
271. GRIFFITHS, G. W. A rare abnormality of the mouth. *Brit. Med. Four.*, July 29, 1899.
262. The perverse action of the soft palate, according to SÄNGER, is that in the formation of "m," "n," "ng," the soft palate is not let down, but is curved. The diagnosis is made when a patient has an obstructed nasal speech and no cause can be found therefor in the throat or nose. POLLAK.
263. Six days after the removal of the papillary hypertrophies from the lower turbinate with the cold snare, articular rheumatism set in and terminated fatally. KRONENBERG assumes an etiological connection. After a similar operation on the other side, a month previously, angina set in. SCHEIBE.
264. Microscopic pictures of two cases of this rare new formation, which ONODI had removed from children. SCHEIBE.
265. In this case the soft palate was usually affected, rarely the tongue, the epiglottis, the vocal cord, and the skin. Urticaria scripteria was also present, but on the skin and not the mucous membrane. After many therapeutic trials, bromide of potash helped. SCHEIBE.
266. A boy, æt. fifteen, had been suffering for two weeks from

tonsillitis and quinsy, aggravated by "hacking cough." He had rigors and hot flushes at short intervals, accompanied by profuse sweating, pulse quick and full, temperature 101° F. The left tonsil was enormously enlarged, protruding beyond the middle line, the crypts were filled with pus, the anterior and posterior pillars were adherent to the tonsil, the gums bled freely and were soaked with pus, and the pharyngeal vault was filled with adenoids and covered with offensive discharge. The diagnosis of general septicæmia was made, and the removal of the tonsil and adenoids resorted to. Two hours after the operation, profuse bleeding from the nose and mouth occurred, and was checked. Pulse became quick, and collapse set in. No special bleeding point was found, but general oozing of venous blood took place, which was also stopped. Pulse improved, transfusion of hot normal salt solution was made, but patient died nine hours after operation.

M. TOEPLITZ.

267. COULTER advocates the radical removal of the hypertrophied faucial tonsil by means of the cautery, for it gives a cosmetically perfect throat, liberates the pillars, removes mechanical obstructions to the sound waves, relieves reflex disturbances, produces retraction and restoration of pillars to normal, and prevents the return of follicular involvement.

M. TOEPLITZ.

268. Patient, æt. thirty-seven, male, had loss of flesh, and presented a mass, as large as an olive, hanging by a narrow pedicle from the lower part of the tonsil, which recurred after removal, and was found to be a lympho-sarcoma. He had lately been suffering from the stomach and bowels. Cervical glands now enlarged. After a month a tumor was found in the left side below the ribs, of the size of a turkey egg. Laparotomy found bowel obstructed by nodular mass in the wall of the gut, and the mesenteric glands along the vertebral column greatly enlarged. Death ensued. The mass was a round-celled sarcoma, and probably represented a case of Hodgkin's disease.

M. TOEPLITZ.

269. A female, æt. twenty-five, presented at the base of the tongue a growth of the size of an English walnut, which, when hyperæmic, filled the fauces. After the use of electrolysis, the tumor was reduced to one-third, but copious bleeding occurred during the last sittings. Dr. McBurney excised the tumor, through an incision made in the middle line from the chin down to the hyoid bone. The tumor was only then found to be a gland

of the thyroid-ductless type. Another case, clinically observed by SCHADLE, could not be verified by operation and the microscope. Schadle believes that the occurrence is due to a congenital defect or a lack of closure of the thyreo-glossal duct as development goes on.

M. TOEPLITZ.

270. THEISEN reports two cases. In the first, of a male, aged twenty-one, the posterior pharyngeal wall, uvula, tonsils, nasopharynx, and lungs were involved; the larynx was free. The disease terminated fatally within six weeks. In the second case, of a female, aged twenty-two, there was a small superficial ulcer upon the posterior pharyngeal wall, a small ulcer in the interarytenoid space of the larynx, and infiltration of the right apex. Theisen had also thirty-five specimens from twenty-three cases of adenoids and twelve of hypertrophied tonsils, taken from unselected cases of children between the ages of four and fifteen years, examined by Dr. Blumer. Of all these, only two tonsils were found to be tuberculous, in one primary with tubercular arthritis of the knee.

M. TOEPLITZ.

271. A child at about the eighth month of gestation presented the following conditions. The gums were completely adherent to each other and the cheeks of the gums posterior to the position of the future canine teeth. A cleft was present in the hard palate; from the sides of the cleft two small fleshy ridges hung vertically downwards. After death it was found that the posterior half of the tongue was alone developed, there was no frænum, and the soft palate was continuous with the posterior wall of the pharynx, the uvula being absent.

ARTHUR CHEATLE.

BOOK NOTICES AND REVIEWS.

I.—**Encyclopædie der Ohrenheilkunde** (*Encyclopædia of Otolology*), edited by Dr. LOUIS BLAU, in Berlin. Prepared by Dr. Alt, Vienna, and sixty-one other aurists, almost all Germans—*e. g.*, Politzer, Grunert, Habermann, Hessler, Jacobson, Jansen, Mygind (Copenhagen), Schwabach, Steinbrügge, Urbantschitsch, Wagenhäuser, Zeroni, Zuckerkandl. Leipzig, 1900. Double-column large-8vo, with but few illustrations, 452 pages, glazed paper, good type. Price \$5.75. G. E. Stechert, 9 E. 16th St., New York.

It contains the essentials of embryology and the comparative, macroscopic, and microscopic anatomy of the organ of hearing, a detailed exposition of the diseases of the ear, etiology, symptomatology, diagnosis, and treatment, with description of instruments, apparatuses, medicines, etc., the various therapeutic procedures; further on an article (meagre) on the history of otology.

The arrangement is alphabetic. It begins with "Abdominal Typhus (Typhoid): its Influence on the Ear," 1½ columns, by Friedrich. To give an idea of the work we cite other examples: "Acusticus and Acoustic Centres"; "Anatomy," by Steinbrügge, 2½ columns; "Diseases," by Alt, Habermann, and Ascher, 8½ columns; "Adenoid Vegetations," very thorough, by Brieger, 23 columns; "Bacteria in the Healthy and Diseased Ear," Gradenigo, 8 columns; "Corti's Organ," with figure, Katz; "Extradural Abscess," Grunert, 8½ columns; "Ossicles, Diseases and Treatment," Ludewig, Passow, Panse; "Hearing Tests," Schwabach; "Hysteria," Gradenigo; "Influence of Climate and Weather," Hessler; "Labyrinth," Katz and others, 30 columns; "Locomotive Engineers"; "Air Douche," Politzer; "Lumbar Puncture," Leutert; "Mastoid Operation," 25 columns, Grunert; "Ménière's Disease," 16 columns, Wagenhäuser; "Otitic Meningitis," Brieger;

"Nasal Passages," Görke, 12 columns ; "Sinuses of Dura Mater," 16 columns, Brieger, Jansen.

This may suffice to show how thoroughly, authoritatively, and up-to-date the many articles of the work have been prepared, and that the volume will be welcomed and appreciated as a ready and reliable book of reference.

H. K.

II.—The Year-Book of the Nose, Throat, and Ear.

"The Nose and Throat," edited by G. P. HEAD, M.D., Professor Post-Graduate Med. School, Chicago.

"The Ear," by ALBERT H. ANDREWS, M.D., Professor Post-Graduate Med. School, Chicago. Chicago Med. Book Co., 1900. Price \$1.50.

We welcome this year-book as instructive and convenient. Most periodicals give more or less extensive reports on the current literature, but a book which comprises the publications of a year in a systematic and comprehensive form is most useful for reference both to the practitioner and the scholar in consulting the newest authors on a case or a literary production. The book contains 274 well printed pages, a review on the year 1899, with supplements from 1898 in a very practical arrangement. As an introduction, the publications in book-form are announced and briefly commented on—for instance, the fifth edition of Lennox Browne's *The Throat and Nose*, Kyle's *The Diseases of the Nose and Throat*, Randall's and Coakley's text-books, and others.

The reviews are systematically arranged, like the table of contents of a text-book—for instance, "The Ear" begins with the articles on the "External Ear," continues with the "Auditory Canal," "Drum Membrane," and so forth. The references are concise and sufficient. They are taken from 170 journals whose titles are printed in a "List of Periodicals," of which two copies are furnished, one appended to the end of the text, the other as a fly-leaf for the reader to have in hand when he peruses the book. Each reference contains a number, corresponding to the title of the journal in the list, and the date of publication behind the name of the author, as in most bibliographies placed at the end of a longer article. A detailed index of authors and subjects is at the end of the volume. In future years it might be desirable to furnish a "Table of Contents," as in every good text-book.

As to the quality of the reviews we cannot say that the dimensions of the reports are always commensurate with the importance of the original articles : apart from that and many omissions,

especially of foreign publications, we have noticed that a good many of the reports are reproductions. In future years we may expect improvements in this respect and, as Americans, welcome with pride "The Year-Book on the Progress of Rhinology, Laryngology, and Otology, consisting exclusively of original reports"—as, for instance, Nagel's *Annual Report of Ophthalmology*.

H. K.

III.—A Manual of Diseases of the Nose and Throat.

By CORNELIUS GODFREY COAKLEY, M.D., Clin. Prof. Laryngology in the University and Bellevue Hospital Medical College, New York City. Illustrated with 92 engravings and 2 colored plates. Lea Bros. & Co., Philadelphia, 1899. A small-8vo volume of 536 pages, for students and practitioners. \$2.75.

It contains: Chapters I. and II. Anatomy of the nose and larynx. III. Examination of the upper respiratory tract; very clear, though compact; excellent details of post. rhinoscopy and laryngoscopy. IV. Antisepsis in operations. V. Nasal obstruction, a list of the various causative conditions. VI. Diseases of the nose; acute, purulent, hypertrophic rhinitis (with full details of operative treatment). Atrophic and vasomotor and membranous rhinitis. Spurs and deviations of the septum. Description of Asch's operation, etc. Abscess and perforation of septum. Tuberculosis and syphilis of the nose. Foreign bodies, polypi, and other benign and malignant growths. Anosmia, hyperosmia, parosmia. Epistaxis. VII. Diseases of the accessory sinuses, diagnosis and treatment. VIII. Diseases of the naso-pharynx. Adenoids are well described; their removal: the middle portion with the Löwenberg forceps, the lateral ones with Gottstein's curette, seems at present to be replaced by the removal with a suitable curette (Beckmann's, for instance) in one properly directed bold stroke. The reviewer saw this mode extensively practised in Berlin last summer, and has since done it himself many times with perfect satisfaction. It seems neither necessary nor even desirable to remove the whole mass of the adenoid growths, just as it is neither necessary nor judicious to remove the whole bulk of the faucial tonsils. Remnants will mostly disappear by their natural shrinkage, and if this should not be the case, or relapses occur, they can easily be dealt with later. I do not mean, however, that we should leave notable portions in Rosenmüller's fossæ or elsewhere.

The remainder of the chapter is taken up by syphilis, foreign

bodies, polypi, and other benign and malignant tumors of the nasopharynx. The description is rather short, but we should not forget that the treatise is intended for students and practitioners of general medicine. IX. Diseases of the oro-pharynx, tonsils, and tongue. This is a very long (123 pages), important, and well-written chapter, dealing, among other affections, of acute and chronic pharyngitis and tonsillitis, retropharyngeal and peritonsillar (quinsy sore-throat) abscesses, chronic tonsillitis (enlarged tonsils) and their treatment (Mathieu's and other tonsillotomes), hypertrophy of the lingual tonsil, diphtheria with treatment (intubation, etc.), syphilis (congenital, inherited, and acquired), lupus, mycosis, foreign bodies, and neuroses of the pharynx. X. The diseases of the larynx occupy 124 pages, appear to be well presented, with a colored plate (II., 8 figures), but as they have no relation to otology we shall not enter into details. Chapter XI. is devoted to general therapeutics of the diseases of the ear, nose, and throat. Classification, general rules, and numerous formulas. A most extensive index (14 double-columned pages) is appended, containing not only the pages of the subject matter, but also the prescription formulas of remedies.

Altogether Coakley's *Manual* is an excellent text-book for students and practitioners. It cannot fail to become popular. The printer's work is most satisfactory: the slightly glazed paper brings the illustrations out distinctly, without trying the eyes of the reader; the size and weight of the volume are convenient for handling, and the price is reasonable. H. K.

IV.—**Letter-, Word-, and Mind-Blindness.** By JAS. HINSHELWOOD, M.A., M.D., Surgeon to the Glasgow Eye Infirmary. Small-8vo., 85 pages. London, H. K. Lewis, 1900. Price, 75 cents.

This little well-written and well-printed monograph is exceedingly interesting and not without a good deal of theoretical and practical importance. It is the re-editing of four papers read by the author before the Glasgow Medico-Chirurgical Society, which appeared in the *Lancet*. The author says: "These articles, embracing the result of extensive reading, as well as my own studies and observations, give a fairly comprehensive view of a subject which has not received much attention in English medical literature. I have thought that the publication of these papers in book form would make them more accessible to those interested in the subject." The subject is that of amnesic or

sensory aphasia in all its varieties, especially that of visual or optical aphasia or word-blindness. The five chapters are on: the visual memory; letter-, word-, and mind-blindness; a case of partial mind-blindness with dyslexia, a peculiar form of word-blindness; word- without letter-blindness; and letter- without word-blindness. To the aurist, all these forms of sensory aphasia are of particular importance in localizing a destruction or inaction of cerebral substance. The auditory memory centre seems to be located, with sufficient certainty, in the posterior end of the first temporo-sphenoidal convolution. The visual memory centre, with its subdivisions: word-, letter-, number-, and note-blindness, alexia, agraphia, etc., are all located in the temporo-sphenoidal lobe, but there is still uncertainty about their particular seats, a subject of great importance in diagnosing the presence and location of a brain abscess. The reviewer, who read the author's papers when they appeared, feels sure that every one of his colleagues will like to have this little book always at hand.

H. K.

V.—The Cerebro-Spinal Fluid; its Spontaneous Escape from the Nose, with Observations on its Composition and its Function in the Human Subject. By ST. CLAIR THOMSON, M.D., M.R.C.P. and F.R.C.S. Engl., Phys. to the Throat Hospital, Golden Sq.; Surgeon to the Royal Ear Hospital, London.

The author, stimulated by the observations of a marked case which he, thus far, has followed up two years, has compiled from literature all cases of hydrorrhœa nasalis, etc., he could find. Besides his own, he found 20 of undoubted cerebro-spinal rhinorrhœa, most of which were associated with cerebral symptoms and some with retinal changes. The picture of the disease, as far as symptoms are concerned, is clear and distinct; its pathology doubtful, only two autopsies being on record. The monograph is very remarkable as to perspicacity and painstaking labor in seeking to shed light on a rare and unrecognized disease. Last year the reviewer had under his care a marked case of cerebro-spinal rhinorrhœa in a woman of 54 years, who was very hard of hearing.

The excellent monograph of St. Clair Thomson will wake an echo everywhere, and we shall probably hear more of this disease in the near future. The author indicates which points should receive particular attention, especially what should be looked for in autopsies.

H. K.

VI.—**Pathologie und Therapie der entzündlichen Erkrankungen der Nebenhölen der Nase.** By Dr. M. HAJEK. F. Deuticke, Leipzig and Vienna, 1899, pp. 328.

The appearance of a book on the *Accessory Cavities of the Nose* will be eagerly welcomed by everyone interested in this branch of medicine which has made such rapid strides of recent years. This subject has usually received but scant treatment in general text-books on the nose, due chiefly to an inadequate appreciation of the anatomical relations involved. The only book previously issued on this subject, that of Grünwald, *Die Naseneiterungen*, has reached a second edition (and is soon to appear in an English translation); this book is essentially clinical and has received well merited recognition, but the anatomical part is very insufficiently dealt with. It is just in the anatomical part that Hajek's book will fill a much-felt want. Dr. Hajek's anatomical proficiency has long been known, especially by the many who have profited by his course of demonstrations in Vienna. The high excellence of this part of the book cannot be praised enough; the illustrations, especially showing the anatomical relations and peculiarities, are unusually well executed and very instructive. Though excellent and fundamental works on the anatomy of the nose and accessory sinuses have been published by Zuckerkandl, Fränckel, Onodi, and others, we find in Hajek's book all the essentials of anatomy in a compact form and discussed in direct relation to the pathology, symptoms, and treatment.

The book is divided into a general and a special part. In the former, the etiology, symptoms, and general diagnosis of accessory-sinus diseases are treated. In the latter, each accessory cavity or sinus is taken up in turn and more specially; the anatomy, pathology, etiology, symptoms, and treatment are exhaustively treated. It should be stated that the methods and difficulties of diagnosis are fully exposed.

A short chapter on accessory-sinus disease in ozæna is presented with the view of showing the frequent involvement of the sinuses in ozæna. Ocular and cerebral complications are discussed; the author acknowledges in this connection his indebtedness to Kuhnt's and Dreyfuss's monographs.

The book in short is a classic; we can only express the wish that an English translation may soon appear and thus make it more accessible to many English readers.

A. H. K.

MISCELLANEOUS NOTES.

NOTES.

Among the many of the important results of the brilliant success of the VIth International Otological Congress, held in London in August, 1899, we like to note the foundation of

The Otological Society of the United Kingdom.

At a meeting held on Monday, December 18, 1899, the following gentlemen were elected to hold office during the first session :

President: SIR WILLIAM DALBY.

Vice-Presidents: URBAN PRITCHARD, THOMAS BARR, GEORGE FIELD.

Treasurer : A. E. CUMBERBATCH.

Librarian: E CRESSWELL BABER.

Secretaries: CHARLES A. BALLANCE, ARTHUR H. CHEATLE.

Council : VICTOR HORSLEY, T. MARK HOVELL, EDWARD LAW, WILLIAM MILLIGAN, P. MCBRIDE, A. W. SANDFORD.

The meetings of the Society, which already numbers over fifty members, will be held at the Medical Society's rooms, 11 Chandos Street, Cavendish Sq., on the first Monday in the months of December, February, March, and May, at 4:30 P.M.¹

¹ The American Editor of these ARCHIVES is not afraid of committing an indiscretion by publishing the following part of a letter addressed to him by the President of the VIth Intern. Otol. Congress :

" You are quite right that the success of the Congress repaid, and more than repaid, all the trouble we were put to. The fact is, that all our large committees worked without the least friction, and seemed to vie with one another to see who could do the most. I should not have thought it possible for us all to have thus joined without signs of jealousy. The fact is that working for the Congress and its success has united the British aural surgeons as nothing else could have done. Moreover, the Congress has impressed the medical profession of the kingdom with the importance of this once despised branch."

Programme of the first ordinary meeting, Monday, February 5, 1900. CHARLES A. BALLANCE, Pres.; ARTHUR H. CHEATLE, Hon. Sec.

AGENDA: (a) Minutes of last meeting. (b) Nominations. (c) Introductory address by the President. (d) A short paper on "Antiseptics in Aural Surgery," by Professor URBAN PRITCHARD.

(e) The following cases and specimens will be shown :

1. Dr. MILLIGAN—(i.) Notes of a case of Cerebellar Abscess recently operated upon. (ii.) Specimens of Abscess of the Cerebellum following Chronic Middle-Ear Suppuration.

2. Professor URBAN PRITCHARD—Specimen of Cholesteatoma removed through the Meatus, with the patient from whom it was removed. Antrum and Mastoid Process hollowed out.

3. Dr. DUNDAS GRANT—A case of Thrombo-phlebitis of the Lateral Sinus, treated by operation without ligature of the Internal Jugular Vein. Recovery.

4. Dr. TILLEY—(i.) Specimen of large Cholesteatoma removed from the Mastoid in a boy aged 14 years. (ii.) Specimens of Cholesteatoma removed from the Auditory Meatus.

5. Dr. SINCLAIR THOMSON—Male patient with continuous slight pain after the radical Mastoid operation.

6. Dr. RICHARD LAKE—Male with exostosis occluding external Auditory Meatus.

7. Mr. L. A. LAWRENCE—Elderly woman with a growth (?) in the Meatus. With microscopical section.

8. Dr. JOBSON HORNE—Specimen of Chronic Middle-Ear Suppuration with extension to the Labyrinth and through the Saccus Endolymphaticus to the Lateral Sinus and Meninges.

9. Mr. ARTHUR CHEATLE—(i.) Patient in whom a large part of the Auricle and the whole of the Meatus has been removed for Adeno-Carcinoma, and in whom the post-aural operation has been performed. With specimen and microscopical section. (ii.) A case of Chronic Middle-Ear Suppuration and Thrombosis of the Lateral Sinus; in which the Internal Jugular Vein was not ligatured. Recovery.

10. Mr. ERNEST WAGGETT—Sequestration of Cochlea in a case of cured Cerebellar Abscess.

SOCIETY MEETINGS.

Fifth Triennial Congress of American Physicians and Surgeons, Washington, D. C., May 1, 2, and 3, 1900. President, Dr. H. G. MILLER, Providence, R. I. Secretary, F. L. JACK, Boston, Mass. Dr. F. B. LORING, Washington, D.C., member of arrangements for the Otological Society.

American Medical Association, Atlantic City, N. J., June 5-8, 1900. Section of Laryngology and Otology. President, C. R. HOLMES, Cincinnati; Secretary, J. A. STUCKEY, Lexington, Ky.

Western Ophthalmological and Oto-Laryngological Society will meet in St. Louis, Mo., April 7-9.

British Medical Association Meeting, 1900.

The sixty-eighth meeting will take place at Ipswich, from July 1st to August 3d, inclusive.

The officers of the Section of Laryngology and Otology are :
President : SCANES SPICER.

Vice-Presidents: HERBERT TILLY, WILLIAM MILLIGAN.

Hon.-Secs.: HARRY LAMBERT LACK, 48 Harley Street, London, W.; ARTHUR YOUNG PRINGLE, 64 St. Matthew Street, Ipswich.

The **Société Française d'Otologie et de Laringologie** will meet Monday, May 14, 1900, at 8 P.M. Hôtel des Sociétés Savantes, rue Danton, Paris. The subjects for general discussion are : 1° De la septico-pyohémie d'origine otique. Introduced by M. LAURENS. 2° Des ulcérations de l'amygdale. Introduced by MM. RAOULT et BRINDEL. *Le Secrétaire général*, Dr. JOAL, 17 rue Cambacérès, Paris.

APPOINTMENTS.

Appointed Aural Surgeons at the Manhattan Eye and Ear Hospital, New York, January 16, 1900 :

JAMES B. CLEMENS, T. PASSMORE BERENS, WENDELL C. PHILLIPS.
J. B. C.

At its last meeting, the Board of Trustees of the Eye, Ear, Nose, and Throat Hospital of New Orleans elected Dr. GORDON KING to the position of Acting Surgeon in charge of the Ear, Nose, and Throat Department of that institution.

At the same meeting, Drs. H. J. DUPUY and A. B. GAUDET were made Assistants in that service.

New Orleans, March 1, 1900.

J. GALBRAITH CONNAL, M.B., has been appointed Lecturer on Aural Surgery in Anderson's College Medical School, Glasgow.

ERNEST WAGGETT, M.B., B.C., has been appointed Surgeon to the London Throat Hospital.

PROPOSED MEMORIAL

OF THE SIXTH INTERNATIONAL OTOLOGICAL CONGRESS.

Prof. A. POLITZER sends the following circular for publication in these ARCHIVES. Needless to say that we heartily endorse the proposition :

In consideration of the great hospitality shown us by our English colleagues during the Otological Congress in London, we feel it our duty to give them some indication of our gratitude.

We would therefore propose to have made heliotypes of the President, Dr. URBAN PRITCHARD ; the Secretary, Dr. CRESSWELL BABER, and the Treasurer, Dr. CUMBERBATCH, and to send copies of them to all the English members of the Congress.

We trust you will endorse this proposal and subscribe the amount of one dollar, which will entitle you to a copy of the portraits.

The list of subscribers will be presented to Dr. PRITCHARD.

Kindly send the subscription to Prof. POLITZER, Gonzaga-gasse 19, Vienna, Austria [or to Dr. H. KNAPP, 26 West 40th St., New York, who will receive, acknowledge, and forward them.]

DR. BENNI,	PROF. LUCAE,
DR. CAPART,	DR. MOLL,
PROF. GRAZZI,	DR. ROHRER,
DR. GUYE,	DR. SCHMIEGELOW,
PROF. KNAPP,	DR. STEIN.

OBITUARY.

Dr. CHARLES DELSTANCHE died January 27, 1900, at Brussels in the sixtieth year of his life. His father was the first aural specialist in Belgium. The son studied at the University of Bologna in the "Collège Belge," still existing in that Italian city,

and later at several European universities. Returned to Brussels he practised general medicine for three years and distinguished himself in particular during the cholera epidemic in 1866. In 1872 he published his thesis on *Tinnitus Aurium*, for which he obtained the position of *agrégé* to the University of Brussels. Since then he has made many valuable contributions to aural surgery. His instruments have been greatly appreciated, especially his *rarefacteur*, for which the International Otological Congress of London awarded him the Lenval prize in August, 1899. In 1872 he was authorized to teach otology at the Brussels University, and in 1874, owing to his efforts, the first Dispensary for Ear Diseases was opened at the St. John's Hospital. In 1890 he was appointed clinical professor of otology. As a physician he was no less popular than as a teacher. He was present at all the larger meetings of otologists. At the Fourth International Otological Congress at Milan, 1880, he was a conspicuous figure by his interest and eloquence in the debates and social gatherings. He was at the zenith of his reputation, when he led the deliberations as president of the Fifth International Congress, in his native city, in 1888. In the same year he founded the Belgian Otological and Laryngological Society.

As the last, but by no means least factor of his happy career, we should not omit to mention that Charles Delstanche enjoyed a cloudless family life and witnessed the development of a promising son as his successor.

ARTHUR HARTMANN.

Contents of the last issues of the Zeitsch. für Ohrenheilkunde (German Edition of these ARCHIVES).

Since our last report on the contents of the German edition of these ARCHIVES in our No. 4, August, 1899, a whole volume (XXXV.) with 19 original articles (some of them translations from the English edition) has appeared, which will soon be published in the English edition; furthermore three numbers of Vol. XXXVI. of the German edition have been published; a double number issued December, 1899, and No. 3, issued February, 1900. The English edition has never been backward in the publication of the carefully prepared reports on the progress of otology, nor in matters of general and professional interest, whereas the numerous original papers could not be rendered in English at a short notice. Our next numbers will contain important papers with exquisite illustrations.

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ARCHIVES OF OTOLOGY.

RE-EXAMINATION OF THE HEARING OF DEAF-MUTES ORIGINALLY TESTED IN 1893.

BY PROF. F. BEZOLD OF MUNICH.

With Plates I. and II. of Vol. XXX. of Germ. Ed.

Translated and Abridged by Dr. J. A. SPALDING, Portland, Me.

THE examinations of the hearing of deaf-mutes, which I made some years ago in Munich, have been carefully investigated by the Ministry of the Interior in the Kingdom of Bavaria, and the Minister of Education has lately given me an opportunity to demonstrate before him, personally, by means of the continuous series of tones as well as by the voice, the presence of some remnants of hearing in a number of scholars in our Deaf-Mute Institute. Whilst making this demonstration, I found that twenty-eight of the scholars whom I had tested before still remained in the Institute, and it then occurred to me to extend my former investigations into this very interesting province of otiatrics, by means of Prof. Edelmann's improved series of tones.

It was with a good deal of anxiety that I began this re-examination, for although I exercised the greatest care originally, the possibility of many errors having unintentionally crept in could not be absolutely excluded. For, in the first place, the tone-series originally employed was imperfect (especially in the twice-scored octave) in comparison with the other octaves, a defect which Prof. Edelmann has avoided by making much more intense the upper portion of the scale, the very space which is so often preserved in deaf-mutes. In the second place, I was afraid of the extreme youth, the defective replies, and lack of self-reliance in those

pupils who were now to face me for re-examination, for all the older pupils had graduated, only the youngest were left, and amongst the notes attached to their names, at the first examination, were such remarks as these: "Apparently total deafness," "Answers far from trustworthy," and so on.

However, in order to verify the condition of those who were then the youngest, to carry the question of the hearing of deaf-mutes still farther along, and for other reasons which shall soon appear, re-examination seemed not only desirable but even a necessity.

The first point to investigate was the different results likely to be obtained by Prof. Edelman's new tone-series, with their powerful and reinforced tones in those regions especially in which my former series had been noticeably defective. Some authors, for example, have asserted that *equally powerful pure tones* do not produce the same results on the hearing when produced by different instruments. The falsity of this assertion I saw plainly enough at my original examination, and additionally I expressed the opinion that we might later on find some perception still present for a series of tones which had at that time escaped my observation, because in certain regions the intensity of my tone-series was too weak to get all possible results.

Furthermore, *we are not positively sure whether the remnant of hearing in deaf-mutes remains on the average entirely stationary.* We must assume in most cases *defects* in the percipient apparatus, between which a few districts are still preserved, and that the morbid process producing these defects has long since terminated. At the same time we can additionally represent to ourselves, that, for example, a cicatricial contraction, a calcification, or an ossification in the cochlea might, after years, extend in circumference and so destroy farther portions of the hearing spaces, particularly former islands of hearing. The inverse theory of return of the function by later *involution* must be regarded as extremely improbable, considering the basal morbid process, and the long time which has elapsed since it ceased to be active.

Finally, in answer to the question whether some defects

might not depend solely on torpidity of the auditory nerve elements, and might be improved by hearing exercises by means of tones corresponding with the defective regions, we can only reply that, judging from the successful results which Urbantschitsch and others think that they obtained by exercises with speech and simple tones, only practical experience can decide.

From such points of view the results obtained from the re-examination of these twenty-eight deaf-mute children seem important enough to guarantee a graphic representation, and comparison with the results originally obtained.

Much to my gratification, the variations are less than I thought they would be.

Plates I. and II., at the end of this number of the ARCHIVES, give a plain idea of the hearing remaining, the red lines showing what was originally present, and the blue, the results of the re-examination. The numerals with the ear named at the foot of both tables, as well as those in the remainder of this paper, refer to the cases successfully observed, and the same numbers refer to both examinations.

The greatest errors were discovered in the fifty-four ears belonging to twenty-seven re-examined children amongst those first noted as totally deaf.¹ For amongst these fifty-four ears twenty-five belonging to eighteen deaf-mutes were originally noted as totally deaf, whilst re-examination showed that four were by no means totally deaf, two having an island of hearing, and two an extensive district.

One island in Case 62 R (Plate I., Group I.) extended from a^{II} to a^{IV} , but was only discovered on blowing very forcibly with Edelmann's organ pipes, and the other one (38 L, Pl. I., Gr. I.) from f^{III} to e^V , and was only discovered by Edelmann's whistle and Lucae's forks c^{IV} to f^{IV} .

Case 73 R and L (Pl. II., Gr. IV. and VI.) was at first with difficulty tested and noted as "apparent totally deaf," and, although now exhibiting an extensive region for hearing, cannot be induced to speak. With exception of these four, twenty-one were totally deaf at both examinations.

¹ Case 28 was not amongst those first tested, and proved to belong to those having the best hearing.

On the contrary, amongst the twenty-nine ears which originally showed a remnant of hearing, only one was found in which formerly an island (c^{IV} to a^{IV}) was present, but which has at the re-examination given way to total deafness (Case 44 L, Pl. I., Gr. I.).

The right ear of this same patient (44 R, Pl. I., Gr. II.) is very interesting in comparison with the left, because in the former we found in the midst of a remnant of hearing, of about the same extent as originally with exception of a trifle at the lower tone-limit, *an island from e^{II} to e^{III} about as at first*. The patient's trustworthiness past and present, as demonstrated by the similar results obtained in the right ear, shows us that there can be hardly a doubt that the island of hearing originally present in the *left ear is now totally submerged*.

A somewhat similar case is seen in 39 L (Pl. I., Gr. I.), in which, at the first examination, two hearing regions were discovered, one from b^{III} to d^V and one from f^\sharp to g^I , the latter disappearing in the interval between the two examinations. For this reason the case was taken from the group of defects and placed in that of islands. The upper end of the hearing region was *also abbreviated by seven semitones*, despite the more powerful forks employed, whilst in the other ear (39 R, Pl. I., Gr. I.) the island present at both examinations terminated at the second testing, just as originally at the upper end, whilst at the lower end, dependent on the more powerful sources of tone employed, it extended a little lower down.

These new defects probably signify an increased destructive process in Corti's organs, rather than an error in the examination.

Amongst twenty-eight ears there were but two in which the *original upper tone-limit exceeded the later by more than a semitone*, a difference which might be ascribed to mistakes in observation. In all the others, owing to the loudness of Edelman's apparatus, the newly discovered regions for hearing *were a trifle more elongated than the old, not only at the upper tone-limit, but generally at all places where the hearing region is interrupted*, as well at the lower as the upper, or even at both ends.

I here emphasize the fact that *despite the great differences in power between the old and the new apparatus, just about the same tone-limits (or within a semitone) were found at both examinations.*

Leaving aside the examinations for Galton's whistle, which cannot be expressed in semitones, we find in twenty-eight ears that the region for hearing ceased at the same tone or within a semitone at the upper limit in seven cases, and at the lower limit in twelve cases, and, in the six cases with defects, twice at precisely the upper end of the defect, and twice at the lower. Moreover, there are eleven coincidences for Galton's whistle at the upper end of the hearing region. So that, taking all in all, thirty-four regions for hearing coincide substantially. Having found that the re-examination with the new apparatus exhibits the same tone-limits as those in the first examination, we must take it for granted *that a district of nerve elements provided with relatively normal functions joins directly on to another district which pathologically and anatomically has lost its former functions.*

These sharply defined pathological alterations are in all probability to be sought for in Corti's organs. They give us a well-defined picture of the situation of the districts destroyed, and we are justified in assuming that these pictures are better defined and more perfect than we could obtain by microscopic examination of the labyrinth, just as the determination of the visual field of the eye teaches us more precisely the form and extent of visual defects than a microscopic examination of the retina could do.

In contrast with this uniform coincidence of perception at thirty-four localities in twenty-eight ears, and partly at some other district in the same ear, we find more or less *increase* in the tone space discovered by the more intense new apparatus in twenty-six localities, the excess being but three times, more than one octave, averaging six tones, and from one to two *mm* by Galton's whistle.

Variations like these cannot be explained by mistakes in testing, but must be due to the greater power of the new apparatus. This condition must therefore appear at all

those spots where the transition from the hearing- to the deaf-region in Corti's organs is gradual, the result of diffuse destructive foci in the percipient organs.

Of the four regions which varied greatly three were in the same person (69 R and L, Pl. II., Gr. IV. and V.), and in the fourth (26 R, Pl. I., Gr. I.) Edelmänn's fork and organ pipe were only heard when blown or struck most forcibly. Besides this, the lower portion of the newly discovered region lay in the weakest portion of my first tone-series.

The chief differences lie in the *lower border* of the region for hearing, the one in which *middle-ear processes*, tubal catarrh, etc., in children with hearing, good, bad, or none at all, chiefly exercise their morbid influence, and it may be that this disease was present in some cases at the original examination, or, for reasons cited in my former paper, these deaf-mutes were tested by aërial conduction alone.

The result of the re-examination with new instruments may be summed up in this way: *The number of totally deaf is less than before. Two deaf-mutes, however, lost considerable hearing in the interval, and it would seem as if we were justified in assuming that some cases always show slow advance of the destructive processes in the cochlea. Two children had more hearing than at first test, which may be ascribed to defective replies originally in one case, and in the other to the greater power of Edelmänn's apparatus. The other twenty deaf-mutes showed about the same hearing at both tests, or a moderate increase averaging six semitones.*

The first and very frequent condition (similar, or nearly similar limit for tones) proves that the boundaries of morbid foci on the cochlea are often sharply defined. The second condition (a moderate increase in the extent of the region for hearing) gives us an approximate idea of the amount to which our results may be influenced by differences in the intensity of the various tone-series employed. Nevertheless, this influence has been much less than I had expected.

Although the re-examination discovered a few serious errors that had been made at the first testing, yet the number of coincidences was so great that there can be no doubt that even the youngest deaf-mutes in our Institute can be safely employed

for the collection of statistics of the hearing power of deaf-mutes.

Urbantschitsch has expressed the opinion that even if deaf-mutes are exercised exclusively by speech the hearing for musical instruments and speech alike is improved, even without the use of any of the former; but this opinion I cannot endorse.

Methodic exercises with *tones* were also tried in a very appropriate case for three months with an absolutely negative result.

The tests for the voice, vowels, consonants, and words were limited to cases in which the extensive hearing-region obtained in the tests for tones seemed to promise some minimum hearing for speech. These cases also had been suggested as suitable for such exercises and had already received some brief instruction by that method through the ear. More or less comprehension for speech was found in about one patient in every four — that is to say, in seven children with nine ears, two belonging to the second group (44 R and 58 L), one to the fifth group (26 L), and six to the sixth group (58 R, 66 R, 78 L, 43 R, 41 R, and 41 L).

At the original examination of these ears four were deaf for all vocal sounds except the consonants P, T, R, which were perceived by tactile sensation; at the re-examination, none were so deaf. Originally, three had hearing for a few vowels and consonants, at the re-examination only two. At the original examination two had hearing for words, at the re-examination seven.

In my first paper I laid down the upper and lower limits in the tone-scale which might be lost for hearing without totally destroying the perception for voice, namely the small space between b^1 and g'' , which is indispensable for the understanding of words by the ear. Amongst the scholars re-examined there were but two who had lost perhaps from one to three semitones at the upper border of this little space (58 L and 44 R). The first one possessed the sixth, which I regard as necessary for hearing speech, but lowered a semitone in the scale. He could understand the word "Eight" and the vowels A and E, with one ear, and with the other

ear the same vowels and all the numerals except Five and Six.

The other one (44 R, Pl. I., Gr. II.), who had lost the *three* upper tones of the sixth for speech, and who was also totally deaf in the other ear though having some hearing at the original test, could repeat such numerals as Seven, Nine, Four, Twenty, and so on when spoken directly into the ear, *but could not understand any vowel except U*. Leaving aside the island from f'' to e''' , this child has a very extensive range of hearing, and an *unusually long duration for sounds*. From two points of view the case is interesting; for, firstly, we see how well speech was understood despite the loss for all vowels but U. We must assume that the numerals were recognized solely by combinations of consonants, despite the fact that all of the hissing sounds must have been more or less lost. The case is suggestive of what can be obtained in attentive children by instruction with the voice.

In the second place, we emphasize the fact that the vowel U was perceived although within the patient's defective regions lies the district $d'' e''$ in which Hermann has lately located¹ one of the fundamental tones for U, in opposition to Helmholtz, who located the only fundamental tone for U in the small f, which happens to lie inside the child's region for tones.

I will next refer to the hearing for the voice, in its relation to the situation of the regions for hearing in the tone-scale. For the *only case* which seemed incomprehensible at the first examination was 39 R (Pl. I., Gr. I.), in which both A and O were correctly repeated although the island for hearing lay far away from the fundamental tones for these vowels. The same island was found at the re-examination though elongated several semitones downward. Nevertheless A and O were no longer perceived, so that there must have been a mistake at the first test.

A single case (26 B, Pl. II., Gr. V.) with hearing from f'' to the middle of Galton's whistle, and which was at the first examination deaf for speech, now perceived the vowel I and

¹*Arch. f. d. Gesamt. Physiolog.*, vol. liii., 1893.

the hissing sound "Sh," a condition which coincides with the position of the fundamental tones for the hissing sound, and with the upper fundamental tone, at least, of the vowel I.

The sixth group with extensive ranges for hearing is of great importance so far as future practice with the voice in partial deafness is concerned. Here we found six ears in five patients, one case, No. 73, being omitted, as it was not tested originally. Basing our opinion on the extensive regions for hearing, showing only slight defects at the upper and lower ends, it would seem as if such cases did not represent labyrinthine destruction in the least, but cerebral disturbances possibly in the auditory spheres in the temporal lobe, and that they therefore indicate "*word-deafness*," in the actual sense of the term. Experience alone can tell us whether such a central force of deafmutism is accessible to instruction through the ear. The slight results so far obtained are encouraging.

Four cases in Group VI. (58 R, 66 R, 78 L, and 43 R) were at first deaf to words, but re-examination shows an extensive comprehension for words, two repeating nearly all the numerals and two all of them correctly. The fifth child (41 R and L), who could originally perceive all the numerals, can now repeat them correctly across a room and even Latin words which are wholly unknown to him.

This slight experience proves that even the deaf-mutes of the VI. group, characterized by excessively defective comprehension for speech despite extensive perception for the tone-scale, are very accessible to instruction by speech through the ear. We know that wherever a satisfactory remnant of hearing exists, it can be utilized for the comprehension of the voice by well-conducted instruction, no matter whether the pathological alterations producing the defects of hearing lie in the cochlea or at any locality beyond.

One of the above-mentioned pupils (66) had on the other (left) side a very extensive region for hearing, with, however, a large defect in the middle, embracing the hearing Sixth (f^1 to g^{11}), but if he closed with his moistened forefinger the right ear, belonging to the sixth group and hearing all the

numerals, he was unable on the side containing the defect to hear or to repeat a letter or word. The same thing was noticed in 43 and 78, who on the other side were not only deaf to tones but to speech.

This observation shows that closure of the meatus with the finger in deaf-mutes is sufficient to exclude all hearing from the other ear, even if it possesses abundant remnant of hearing. So that all tests of each separate ear may be considered as more reliable in deaf-mutes than in those who are partially deaf.

Case 78 shows that a part of the hearing for speech discovered at the re-examination is due to the preliminary instruction with the voice through the ear, for the child had only been educated with units, could for that reason only repeat numerals up to ten, and failed to comprehend the higher numerals, although she possessed a region for hearing from the upper limit for Galton's whistle to the middle of the great octave.

Small as are the statistics at my command, the results obtained for the hearing of speech indicate the surprising achievements in the comprehension of speech which brief instruction may produce.

SUPPLEMENTARY REMARKS.

A few days after handing in the present MSS. I received from the Minister of Public Instruction an edict of great importance for the future instruction of deaf-mutes in Bavaria, dependent on their remnant of hearing and speech.

In brief the edict says that all deaf-mutes newly entering the Institute are to be carefully tested for what remnant of hearing they may possess, as well as for any remaining capacity for the comprehension of speech; that those who still remain in the Institute may at any convenient time be re-examined in similar lines by competent aurists; and that those who hear a little or who can speak in the least, in addition to general instruction shall, in special hours, receive proper and skilled instruction for the preservation and possible increase of what hearing and speech they still possess.

Henceforward, then, we may surely expect that the special

care thus assured to the partly hearing and partly vocal deaf-mutes in Bavaria will soon be imitated in other parts of Germany, and that in a future not distant deaf-mutes of all countries will obtain instruction not only to increase what hearing and speech they may have, but this fraction of the normal hearing power to be utilized as a foundation for understanding spoken language such as now prevails, according to Mygind, in several institutions in America, France, and Austria.

FOURTH REPORT ON THE PATIENTS TREATED DURING THE YEAR 1898 IN THE HOSPITAL AND OUTDOOR DEPARTMENT FOR AURAL DISEASES AT THE UNIVERSITY OF STRASS- BURG.

By DR. F. ALEXANDER.

Abridged Translation by Dr. MAX TOEPLITZ, New York.

THIS report is based upon the same principles as that of the years 1896 and 1897. The abundance of the material rendered the writing of a record of the numerous small operations performed at the outdoor department impossible. The more important cases only will be given in this abstract. The character of the tumors, which are not classified, was not ascertained by exploratory excision and microscopical examination.

OUTDOOR DEPARTMENT, 1898.¹

I.—AURAL DISEASES.

Disease.	Right.	Left.	Both.	Total.
A. EXTERNAL EAR.				
<i>a. Auricle.</i>				
Perichondritic abscesses.....	2	..	..	2
Eczema.....	22	14	11	47
Othæmatoma.....	..	1	..	1
Carcinoma.....	1	1	..	2
<i>b. External Auditory Meatus.</i>				
Exostoses.....	1	1	2	4
Cerumen.....	43	55	181	279
Foreign bodies.....	14	8	..	22
Otitis externa, circumscribed.....	27	52	1	80
Otitis externa, diffuse.....	18	21	8	47
Papilloma.....	1	1	..	2
Periauricular abscess following furuncle.....	..	1	..	1

¹ Unimportant diseases omitted in the translation.

Disease.	Right.	Left.	Both.	Total.
<i>c. Membrana Tympani.</i>				
Myringitis hemorrh. traumat.....	1	..	..	1
Hemorrhages.....	3	4	..	7
Ruptures.....	3	9	..	12
B. MIDDLE EAR.				
Hæmatotympanum.....	2	..	..	2
Otitis media, catarrhal acute.....	49	33	20	102
Otitis media, hemorrhagic acute.....	4	5	3	12
Otitis media, catarrhal chronic, and sclerosis.....	5	4	285	294
Otitis media, purulent acute.....	100	97	33	230
Otitis media, purulent acute with otitis of mastoid process.....	8	8	..	16
Otitis media, purulent chronic.....	91	93	81	265
Otitis media, purulent chronic with polypi.....	22	12	5	39
Otitis media, purulent chronic with caries.....	4	13	1	18
Otitis media, purulent chronic with cholesteatoma.....	10	8	1	19
Sequelæ to Otitis media purulenta.....	10	6	28	44
C. INNER EAR AND NERVOUS DISTURBANCES.				
Otalgia.....	14	15	7	36
Neuralgia of the mastoid process.....	..	1	1	2
Injury to labyrinth.....	..	1	4	5
Other labyrinthine diseases.....	2	..	17	19
Fracture of base of skull.....	..	..	3	3

II.—DISEASES OF THE NOSE AND PHARYNX.**A. EXTERNAL NOSE.**

Disease	Total.
Eczema.....	38
Acne rosacea.....	2
Furuncle.....	9
Lupus.....	2
Erysipelas.....	1
Papilloma.....	1
Carcinoma.....	1

Disease.	Right.	Left.	Both.	Total.
B. NASAL CAVITY.				
Rhinitis, catarrhal chronic.....	..	..	113	113
Rhinitis, hypertrophic chronic.....	4	..	76	80
Rhinitis, atrophic chronic.....	1	2	82	85
Ozæna.....	..	..	..	64
Lues nasi.....	..	..	11	11
Lues nasi congenital.....	..	..	4	4
Papilloma of the turbinated bodies.....	2	1	..	3
Polypi.....	6	12	19	37
Hypertrophy of the turbinated bodies:				
a, of the middle turbinated body.....	5	4	2	11
b, of the inferior turbinated body.....	1	2	1	4
c, of the posterior extremities.....	2	..	4	6
Empyema of Highmore's antrum.....	3	6	1	10
Empyema of all accessory cavities.....	3	1	1	5

Disease.	Right.	Left.	Both.	Total.
C. NASO-PHARYNX AND PHARYNX.				
Rhino-pharyngitis, chronic.....	57
Rhino-pharyngitis, chronic atrophic	53
Pharyngitis, chronic.....	29
Pharyngitis, granular.....	26
Lues of pharynx.....	4
Lues of soft palate.....	1
Congenital luic defect in the soft palate.....	2	..	..	2
Uvula bifida.....	1
Paresis of velum palati.....	3
Papilloma of the soft palate.....	1	1	..	2
Cavernoma of the soft palate.....	1	1
Diphtheria of nose and pharynx.....	1
Hypertrophy of faucial tonsils.....	4	3	17	24
Hypertrophy of faucial and pharyngeal tonsils...	183
Hypertrophy of the pharyngeal tonsil.....	480
Hypertrophy of the lingual tonsil.....	3

HOSPITAL OPERATIONS.

Name of Operation.	Number.
Incision of lymphadenitic abscesses.....	1
Incision of periauricular abscesses after furuncle.....	2
Extirpation of auricular tumors.....	3
Extirpation of aural polypi.....	1
Paracentesis.....	1
Chiselling of Mastoid according to <i>Schwartz</i>	15
Chiselling in perisinuous abscesses.....	9
Chiselling in extradural abscess of both cranial fossæ.....	1
Radical operation according to <i>Zaufal-Jansen</i>	32
Radical operation according to <i>Stacke</i>	1
Radical operation according to <i>Zaufal-Jansen</i> with opening of sinus.....	1
Radical operation in cerebellar abscess.....	1
Radical operation with chiselling of labyrinth.....	1
Excision of carcinoma of external nose.....	1
Extirpation of carcinoma of left nasal cavity.....	1
Extirpation of nasal polypi.....	12
Extirpation of hypertrophied turbinated bodies.....	10
Extirpation of posterior extremities and hypertrophied turbinated bodies..	4
Incision of perichondritic abscesses of the nasal septum.....	3
Ablation of deviations of nasal septum.....	14
Opening of Highmore's antrum through canine fossa.....	1
Opening of Highmore's antrum through alveola.....	7
Chiselling of frontal sinus.....	1
Curettement of sphenoid cavity and ethmoid cells.....	1
Removal of tumors of naso-pharynx with cold snare.....	3
Extirpation of faucial tonsils.....	5
Extirpation of faucial and pharyngeal tonsils.....	113
Extirpation of pharyngeal tonsil.....	251
Removal of tumors of vocal cords.....	1
Removal of tumor of Santorini's cartilage (with cold snare by autoscopy)...	1

I may here add a report on an epidemic of erysipelas, which appeared in the hospital at two different periods

during the summer and late fall. Through an outside physician suffering from erysipelas of the head, the infection had been transmitted into the operating room. All precautionary measures, immediately used (disinfection of the operating room and its surroundings, and also of the patients' rooms with formaline, etc.), could not prevent the infection with erysipelas of the following nine patients operated upon from April 1, 1898, until April 1, 1899, among sixty-nine cases :

1. Adele St., æt. twenty-one. Admitted April 27, 1898. Diagnosis : Otitis media, chronic, bilateral, purulent, with polypi and caries of the left temporal bone. April 29th : Radical operation, L. She was seized on May 10, 1898, with erysipelas, which soon assumed a bullous character and was followed by severe nephritis. On May 18, 1898 : Exitus letalis.

2. Emilie E., æt. thirteen. Admitted March 3, 1898. Diagnosis : Otitis media, chronic, purulent, of R E, with periarticular abscess of the joint of the right jaw. April 11, 1898 : Radical operation with opening of the abscess. June 18, 1898 : Erysipelas. June 19, 1898 : Transferred to the Children's Department of the hospital ; thence, after implication of the non-operated side with erysipelas, transferred back on July 9th—after recovery from erysipelas. August 3, 1898 : Additional attack of erysipelas on the right side, of mild character and of three days' duration. August 9, 1898 : Discharged for out-of-door treatment. Beginning of September : Recovery.

3. Magdalene Sch., æt. nineteen. Admitted on June 23, 1898. Diagnosis : Otitis media, purulent, acute, of R E with mastoiditis. June 25, 1898 : Chiselling according to Schwartze. In the beginning, the course of the wound was without reaction. July 12, 1898 : On account of rise of temperature and infiltration of the jugular region, another operation was performed. The sinus (no thrombosis) was exposed and a diseased portion in the apex was removed. July 14, 1898 : Erysipelas. She was transferred to the Department of Internal Diseases and thence discharged on August 9th for out-of-door treatment. End of September : Recovery.

4. Magdalene L., æt. forty-seven. Admitted on June 28, 1898. Diagnosis : Otitis media, purulent, subacute, of R E, with acute mastoiditis. July 2, 1898 : Chiselling according to Schwartze.

July 18, 1898: Erysipelas. She was transferred to the Internal Department and thence discharged on August 19, 1898, for out-of-door treatment. Beginning of October: Recovery.

5. Marie B., æt. thirty-one. Admitted November 19, 1898. Diagnosis: Otitis media, purulent, chronic, of L E, with polypi. November 23, 1898: Radical operation. December 5th: Erysipelas. She was transferred to the Internal Department of the "Bürgerspital," and thence was discharged for out-of-door treatment, which is still carried on; however, the wound cavity is now (July, 1899) almost entirely epidermized.

6. Emil O., æt. twenty-nine. Admitted November 24, 1898. Diagnosis: Periauricular abscess after furuncle. November 26th: Opening of the abscess. December 10th: Erysipelas. He was transferred to the Internal Department of the "Bürgerspital," and thence discharged for out-of-door treatment. Beginning of February: Recovery.

7. Ignaz B., æt. thirty-three. Admitted October 31, 1898. Diagnosis: Otitis media, purulent, chronic, L E. November 3d: Radical operation. December 25th: Erysipelas. He was transferred to the Internal Department and on January 17, 1899, transferred back to the Aural Department; on March 1, 1899, he was discharged as almost entirely cured for treatment by his own physician.

8. Martha St., æt. sixteen. Admitted January 17, 1899. Diagnosis: Otitis media, purulent, chronic, R E. February 17, 1899: Radical operation. February 19, 1899: Erysipelas. The patient was isolated at once. March 23, 1899: discharged for treatment by her own physician. She had then a small granulating portion in the wound cavity, which was otherwise entirely epidermized.

9. Emma L., æt. thirteen. Admitted January 21, 1899. Diagnosis: Otitis media, purulent, chronic, bilateral, caries of the left petrous bone, abscess behind the L E. January 23, 1899: Radical operation L. After cessation of the incipient rise of temperature on January 31, 1899, suddenly 40.2° C. On the following day, typical erysipelas of the left aural region; on February 14, 1899, implication of the right side. On March 18, 1899: Discharged for out-of-door treatment; the wound cavity is now almost entirely epidermized.

It is superfluous to give a detailed description of the course of the erysipelas in each separate case, since it almost

always presented the same or at least a similar picture. The temperatures varied between 38.8° C. and 40.9° C. The diseased portions of the skin were always intensely swollen, highly reddened, their surface shining and mostly painful to the touch; in one case (No. 3), the sensibility upon pressure was increased to an enormous hyperæsthesia. The eruption, which started from the operated wound and, in all cases, had also implicated the scalp, was always defined by the well-known sharp, often serrated, boundary line from the surrounding parts. In three cases the hair fell out profusely, in two cases almost entirely. In two cases (Nos. 2 and 9), even the non-operated side was implicated. The urine contained albumen in three cases; albumen, cylinders, epithelia, etc., in two cases. Vesicles (erysipelas miliare) were present in two cases (Nos. 7 and 9); bullæ (erysipelas bullosum), in one case (No. 1). This case, which ended fatally, began and ran its course under the severest symptoms. The patient was extremely delirious and apathetic from the third day of sickness. Extreme apathy was also at times present in three cases (Nos. 3, 4, and 5). At any rate the intensity of the disease decidedly decreased during the course of the epidemic. For the treatment of the wound during the erysipelalous disease, dressings moistened with a two-per-cent. solution of carbolic acid were almost exclusively used.

Ever since the Aural Department, from the beginning of this year, has two rooms which are completely isolated from the other sick-rooms and received the cases of Nos. 8 and 9 as soon as the very first signs of erysipelas presented themselves, until to-day, no erysipelalous disease has appeared.

A CASE OF BEZOLD'S MASTOIDITIS SECONDARY TO
FACIAL ERYSIPELAS; OPERATION; RECURRENCE OF THE ERYSIPELAS WITHIN TWENTY-FOUR HOURS; CURE.

By JOHN DUNN, M.D., RICHMOND, VA.

On January 13, 1900, I was asked to see Mr. A., aged fifty-nine. Previous history as follows: about December 10, 1899, facial erysipelas developed. It began at the bridge of the nose, spread across his face, involving finally the whole scalp, including the external ears. About the 20th of December Mr. A. experienced severe pain in the left side of his head; three or four days later his left ear began to discharge, without, however, being followed by any diminution of the pain in the aural region. This continued with great severity until I saw him on January 13th. At this time the patient's general appearance did not suggest grave intracranial complications. Appetite excellent. Pulse 90. Temp. $99\frac{1}{2}^{\circ}$. He was, however, suffering intensely with pain in the region of the left ear, which was discharging copiously a whitish-gray fluid. The left mastoid region was so swollen and œdematous, and so sensitive to pressure that little information as to the condition of the bone beneath could be obtained by palpation. On either side of the sterno-mastoid was a large swelling extending two inches below the mastoid tip. As the patient had just finished a rather hearty dinner when I first saw him, he was not operated upon until the following morning at 9 o'clock, at which hour his pulse was 84; temp. $98\frac{1}{4}^{\circ}$. The operation revealed the fact that practically the whole of the mastoid process had been destroyed. A small portion of its external surface was present, and attached to the fibrous portion of the sterno-mastoid about the tip were a few spicules of bone. The inner plate was also extensively destroyed, laying bare a large area of dura mater, whose surface was much roughened.

An incision was made through the skin, including the posterior one fourth of the sterno-mastoid, about two inches below the tip. Through this hole I inserted my middle finger, passing it beneath the sterno-mastoid muscle into the hole left by destruction of the mastoid process. The attic was not examined; the operation being brought to a close after removal of the remaining roughened pieces of bone about the process, and all the more quickly as there was considerable bulging of the brain membrane into the large hole in the inner-table. I could get no history of symptoms pointing to sinus thrombosis, so left the sinus unexamined. The usual dressings were applied. At eight o'clock the next morning I saw Mr. A., who had passed a fairly comfortable night. At this time his pulse was 90; temp. $98\frac{1}{4}^{\circ}$. At ten o'clock I received a message from the nurse that the temperature had gone up to 102° . I at once went to the hospital and removed the dressings to find that the auricle was immensely oedematous, being nearly half an inch thick and fiery red. Erysipelas had set in. Its blush could be seen to extend about three quarters of an inch over the skin anteriorly to the auricle; posteriorly it had reached the lip of the wound. The whole of reddened area, including the auricle and the external auditory canal, which was nearly impervious from the swelling, down to the drum membrane, was painted over three times with pure carbolic acid. The whole surface was then left covered for twenty-four hours with gauze saturated in pure alcohol; the external auditory canal being filled with alcohol every two hours. Quinine and tincture of iron were administered internally. By four o'clock next morning the temperature was down to 99° , which point it did not reach again during the course of the convalescence. The discharge from the external canal ceased entirely within forty-eight hours. The dressings of the mastoid wound were changed twice daily for three weeks. The wound, which steadily grew smaller, to-day, March 30, 1900, closed up finally.

The case has been reported because mastoiditis, occurring in the course of erysipelas, is rare, and because of the rapidity with which the recurrent attack of erysipelas subsided under the prompt and thorough use of carbolic acid and alcohol.

NASAL EMPYEMA AS AN ETIOLOGICAL FACTOR IN
THE ESTABLISHMENT AND CONTINUATION OF
POST-NASAL CATARRH AND CATARRHAL IN-
FLAMMATION OF THE MIDDLE EAR, WITH AN
ESPECIAL CONSIDERATION OF THE ENLARGE-
MENT OF THE POSTERIOR END OF THE MID-
DLE TURBINATE AS A PREDISPOSING CAUSE.

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THE widespread prevalence of catarrhal inflammation of the middle ear and the relentless course it pursues when once established, make the study of the disease of fascinating interest. That chronic catarrhal inflammation of the middle ear is caused, or at least unfavorably influenced, by catarrhal diseases of the nose and naso-pharynx is a fact which has been accepted by otologists for many years, and it is the relation, or perhaps identity, of the catarrhal inflammation of the ears to the general, or local catarrhal condition of the respiratory tract, which we wish to study in this paper. We will not consider in this connection those diseases of the nasal mucous membrane which are closely allied to diseases of the skin, of which the relation between eczema and asthma furnishes an example. This omission is made with a full appreciation of the relation of such diseased conditions of the respiratory mucous membrane to the chronic inflammatory process of the membrane lining the middle-ear cavity, but it has seemed preferable at this time to deal with the more common diseased conditions which are usually known as catarrhal—*i. e.*, accompanied by a discharge. Nor shall we consider such diseases

at tuberculosis, syphilis, and new growths of the upper respiratory tract only in so far as they are a causative factor in the establishment or continuance of the catarrhal discharge. With this brief explanation of the scope of this paper, we will proceed to the consideration of the catarrhal disease condition of the upper respiratory tract and the chronic catarrhal inflammations of the middle ear which are caused by it.

Politzer states what is very probably the general belief among otologists when he says that "The diseases of the naso-pharynx, and of the nasal cavities, are not only frequently the forerunners of affections of the middle ear, but also exert an important influence upon the course and results of these affections. Their knowledge and treatment appears the more important to the ear specialist, as in the middle-ear disease, by the occurrence or continuation of a naso-pharyngeal affection, the ear disease is continued, and the return to the normal prevented." The recognition and removal of adenoid vegetations from the naso-pharynx has given, by the relief of catarrhal inflammation of the middle ear in children, abundant evidence that disease of the naso-pharynx is closely associated with middle-ear disease, and in this particular class of patients the naso-pharyngeal disease is without doubt the cause of the ear disease. If the other disease conditions of the naso-pharynx bear the same relation to middle-ear disease that adenoids do, then the study of the naso-pharynx and nasal cavities is of the utmost importance. It is important to inquire in what way a naso-pharyngeal or nasal disease affects the middle ear. The generally accepted opinion has been that the aural disease is caused by an obstruction to nasal breathing, and the negative pressure (Toynbee experiment) resulting from this. It is now known that adenoids produce aural disease in many cases in which they do not cause nasal obstruction, and that it is the location of the adenoid growth in or around the Eustachian tube, rather than the interference with nasal respiration, that causes the middle-ear disease. The location of an adenoid growth, as well as the changes which it undergoes from time to time, are very well seen in cases of cleft

aladte. In these cases there is evidently no nasal obstruction, but the obstruction of the Eustachian tube by the adenoid growth can be plainly seen. In other diseased conditions of the naso-pharynx associated with middle-ear disease, the same relation may exist between the two, though perhaps not always in the same way, that exists between middle-ear disease and adenoids. Adenoids may cause Eustachian obstruction in a purely mechanical way, while in other naso-pharyngeal diseases the mucous membrane of the Eustachian tube, and often that of the middle ear, is affected by an extension of the disease of the naso-pharynx. It is very rare for the other diseases of the naso-pharynx to cause the purely mechanical obstruction that adenoids do.

The question naturally arises, what are the causes of naso-pharyngeal disease and what makes it so intractable? The naso-pharynx is subject to any of the acute diseases of mucous membranes in general, but these attacks should, and in most cases do, run the course of acute inflammation of the mucous membrane in other situations. Acute naso-pharyngitis is a self-limiting disease, and there is nothing about the naso-pharynx that should cause an acute disease to pass over into a chronic one. The drainage is good, being in fact an inverted basin, and there are no pockets to retain the products of inflammation and so act as a source of repeated infections. The only pocket that was ever seriously claimed to exist in the naso-pharynx was Thornwaldt's bursa, and this is now known to be a depression in a neglected adenoid. Neglected adenoids may also cause bands of tissue, which evidently limit motion in the upper part of the pharynx, but these bands can hardly be said to form pockets which could retain infective material. Chronic naso-pharyngitis is not often, if it is ever, the result of an acute attack, although the acute exacerbations occurring in the course of the chronic disease are very deceptive and often pass as acute primary naso-pharyngitis. Acute disease of the naso-pharynx is probably always of bacterial origin. This opinion is held by Lennox Brown and many other competent observers. The different ways in which infection may reach the naso-pharynx are, first, as a part of the

general involvement of the whole of the upper respiratory tract, in coryza, influenza, and the beginning of pneumonia; secondly, by infection from chronic nasal disease; thirdly, by an extension upwards of an acute inflammation of the oropharynx, and lastly from such general systemic infections as tuberculosis, syphilis, general septicæmia, and the exanthemata. In those cases in which acute naso-pharyngitis occurs during the course of an acute coryza, the naso-pharynx may be involved at once or the inflammation may exist in the nose several days before it affects the naso-pharynx. During an attack of acute naso-pharyngitis from whatever cause, the lymph tissue of the pharyngeal vault is involved, but the inflammation should run the course of inflammation in similar tissue elsewhere and end in recovery. This is undoubtedly the result in a large majority of the cases, and it would be the result in all if the lymph tissue of the naso-pharynx were not subjected to repeated reinfection. If the naso-pharynx is examined with the post-nasal mirror in cases of post-nasal catarrh, the mucous membrane will be found red, swollen, and uneven. This condition may involve the whole post-nasal space in acute cases, while in the chronic cases, the redness and swelling may be limited to circumscribed patches varying in size from a few millimetres to several centimetres in diameter. The lymph glands are always involved, not alone in the vault of the pharynx, but those on the posterior and lateral walls of the oropharynx as well, and appear as solitary follicles (follicular pharyngitis), as bands or stripes (lateral pharyngeal hypertrophy), or as a slightly raised granular surface. There is very little secretion to be seen except in those cases where an atrophic rhinitis has extended to the naso-pharynx or in cases in which the post-nasal catarrh has existed for years and the acinous glands have become involved. In the latter class of cases the discharge is thin, glairy, and very tenacious, and it often gives a shiny appearance to the mucous membrane. The cases which have a large amount of secretion in the naso-pharynx are either cases of atrophic disease or neglected cases of sinus disease. In those cases in which the pharyngeal vault is free from secretion the patient can

by sniffing and clearing the throat obtain more or less secretion, thus showing the source of the discharge to be in the nasal cavities. Except in the cases noted above and in cases where either syphilitic or tuberculous ulcers exist in the post-nasal space, there is no evidence that any considerable amount of the discharge in cases of post-nasal catarrh originates in any part of the pharynx. On the other hand, the appearance of the naso-pharynx, the absence of secretion on inspection, and the method of clearing the throat shows that the discharge comes from the nose and that the lymph tissue is infected by this discharge. In other words, the inflammation of the mucous membrane of the naso-pharynx and the involvement of the lymph tissue is a secondary disease caused by an irritant discharge from the nasal cavities. That the discharge from the nose is irritant we have abundant evidence in the excoriations around the nostrils and extending to the lips in cases of acute rhinitis and the purulent catarrhs of children. If a condition similar to that which is found in the naso-pharynx existed in any other part of the body, no one at the present day would consider it a primary disease, but every surgeon would at once search for the source of the infection.

The effect of this condition of the naso-pharynx on the ears is very evident, the ears are especially liable to suffer, indeed they can hardly escape, if the lymph tissue in or around the Eustachian tubes is involved by repeated infection from an irritant nasal discharge. There is every reason to believe that the inflammation of the naso-pharynx may extend to the middle ear itself, either by continuity of tissue or by the forcible blowing of the irritant discharge through the Eustachian tube into the middle-ear cavity. The appearance of the membrane of the middle ear in cases of chronic catharrhal inflammation, as described by Politzer, resembles so closely the appearance of the mucous membrane of the naso-pharynx in cases of post-nasal catarrh as to suggest a common origin. The same solitary follicles and the same circumscribed patches of red, raised, granular mucous membrane exist in both and would seem to indicate that the disease was the same in one situation as in the other. For

reasons that are obvious, the results of the inflammation are much more serious in the middle ear than they are in the naso-pharynx. It is not the purpose of this paper to discuss the pathological changes that take place in chronic catarrhal inflammation of the middle ear but simply to show the relation of the two diseases and to find a rational explanation of chronic post-nasal catarrh.

If the assumption is correct, that to establish a chronic post-nasal discharge, with all its attendant symptoms, it is necessary to have a pocket which acts as a reservoir to retain the products of inflammatory action, and further if the normal naso-pharynx does not contain such pockets then it is necessary to examine the surrounding parts in search of such pockets. If we do this we find a large number (the nasal accessory sinuses) which open into the nasal cavities as a common drainage way. In the normal condition these sinuses communicate by free openings with the nose and whatever secretion there may be from them is carried, together with the secretion from the other parts of the nasal cavity, by the action of the cilia, to the naso-pharynx. It is only when the sinuses become the seat of chronic disease that they assume any importance as an etiological factor in the production of the chronic catarrhal condition. Disease of these sinuses may be so extensive and so severe as to menace the health or even the life of the patient, or they may be so slight that the only symptom is an intermittent discharge into the naso-pharynx. Whether we accept the statement of Hajek that "the whole chain of catarrhal symptoms of the nose, naso-pharynx, larynx, trachea, bronchi, and of the lungs themselves is dependant upon nasal empyema, we must, I think, admit that there is a close relation between the disease of the accessory sinuses and chronic catarrh of the upper part of the respiratory tract. I am fully convinced that there is no other explanation of chronic catarrhal naso-pharyngitis but this. I came to this conclusion from clinical experience, some time before I saw Hajek's statement, and further observation has only confirmed me in this belief. A daily discharge from a nasal empyema passing through the naso-pharynx is sufficient to

cause all the symptoms of post-nasal catarrh and I know no other condition that is,¹

To establish a nasal empyema it is necessary to have certain predisposing causes which may exist either singly or combined in a given case; they are:

First. Congenital defective formation of the bony walls of the nasal cavities, such as a middle turbinate which is strongly rolled outward, so leaving a small space for drainage, small openings to the cavities, cavities badly placed for drainage, and an extremely narrow nasal cavity.

Secondly. Partial or complete closure of the normal openings of the cavities. This stenosis may be the result of disease or of acquired deformity, such as polypoid degeneration of the mucous membrane and new growths of all kinds, syphilitic, tuberculous, and nonspecific osteitis and periostitis, a bullous middle turbinate, spurs, deviated septum, and general or local vascular or fibrous hypertrophy of the nasal tissue. The last condition is very often the result of nasal empyema, and cannot therefore in many cases be considered as a cause.

Thirdly. Unhealthy surroundings which increase the liability of infection. Also the virulence of the infection and often the lowered resistance of the patient.

If we examine the predisposing causes more in detail, we find that deviated septi and spurs are causes of nasal empyema, post-nasal catarrh, and catarrhal deafness only when they are so located or are of such degree that they interfere with the drainage from the accessory sinuses. It follows therefore that operations for the relief of these conditions will have a beneficial effect upon the deafness only in those cases in which the more affected ear corresponds to the more occluded nasal cavity.

The chief predisposing cause of nasal empyema is the position, size, and diseased condition of the middle turbinate or of the tissues surrounding it. The middle turbinate varies in size from a mere ridge to a body several centimetres

¹ When this paper was nearly ready to go to press I found that this opinion of the origin of post-nasal catarrh is held by Grünwald and Moritz Schmidt. Grünwald's *Nasal Suppuration*, 2d ed. page 108.

in thickness. It usually extends only to the posterior third of the nasal cavity, but when diseased, it may reach as far as the Eustachian tube.

We expect to find nasal empyema in all cases of polypoid disease in the region of the middle turbinate and the same holds true of new growths in this region. After all the cases in which there is evident disease of or around the middle turbinate have been eliminated, there still remains a vast number of cases which have nasal empyema. These cases are caused by a middle turbinate which approaches too close to the nasal wall, by cells which are badly placed for drainage, or by focal disease within the cell itself. The space between the middle turbinate and the nasal wall, through which the drainage from the antrum, the anterior ethmoid cells, and frontal sinus passes, may be much narrowed and still serve its purpose until the cells and the nasal mucous membrane have been subjected to repeated and prolonged attacks of inflammation, or the first severe attack may establish a nasal empyema. An acute inflammation may entirely close the natural openings of the cavities and thus cause the products of inflammation to become encysted or, as occurs in a large proportion of the cases, after the acute congestion has partially subsided, the inflammatory thickening only partially closes the openings and thus allows a discharge of mucous or muco-pus to escape into the nose and naso-pharynx, either constantly or at irregular intervals. In many cases there is never any discharge visible in the nose on examination, because of the middle turbinate being so closely rolled outward that it forms a sort of gutter which conducts the discharge to the naso-pharynx without it ever appearing in the nose. In this way the discharge from the antrum of Highmore or from the anterior ethmoid cells or frontal sinuses may reach the naso-pharynx and appear as a post-nasal catarrh.

In this connection I wish to call attention to a malformation of the middle turbinate which is almost constantly present in cases of post-nasal catarrh. So far as I know the relation of this particular malformation of the middle turbinate to post-nasal catarrh has not previously been

reported. The malformation consists of an enlargement and downward prolongation of the posterior end of the middle turbinate.¹ It is often large enough to nearly or quite fill the space between the septum and the nasal wall. It rarely reaches to the lower meatus, but is confined for the most part to the middle meatus. Owing to its situation far back in the nasal cavity, and also at times to the presence of a tortuous or narrow nasal chamber or, what is still more common, the presence of hypertrophy of the nasal mucous membrane, it may be easily overlooked, unless it be searched for after the tissues have been shrunk by the application of cocaine. The enlargement of the middle turbinate often contains a cell of some size which may be the source of some discharge, but the larger part probably comes from the posterior ethmoid cells or the sphenoid sinus, although, as previously stated, the drainage from any one of the sinuses may be concealed by the middle turbinate. The openings of the posterior ethmoid cells and sphenoid sinus are partially and probably at times wholly closed by this part of the middle turbinate, and it thus acts as a predisposing cause for the formation of an empyema in them. The formation of a gutter by the middle turbinate which has been alluded to before should not be forgotten in connection with this enlargement of the posterior end. This part of the nasal cavity is inflamed during each attack of acute rhinitis, from whatever cause, and often the inflammatory process is not apparent in any other part of the nasal cavity. This is especially noticeable in those patients that suffer from a succession of colds during the winter and spring months. If this part of the nose is carefully examined during the progress of an attack of this kind, the enlargement of the middle turbinate will be found

¹ In many of these cases the anterior part of the middle turbinate is not developed, so that which I have described as a malformation is the only portion which is visible by rhinoscopic examination, but even in those cases in which the enlarged posterior end comprises the whole of the middle turbinal, an essential malformation exists. It is well to bear in mind that in these cases the drainage from the antrum, the anterior ethmoid cells, and the frontal sinus probably still takes place through the space between the middle turbinate and the nasal wall and that it would therefore be much nearer to the naso-pharynx than in the normal nose.

swollen and dusky red in color, the rest of the nasal cavity perhaps being free from all appearance of inflammation. This swelling gives rise to a sense of stuffiness and to more or less headache. As the attack begins to subside it is often possible to see a mucous or muco-purulent discharge flowing down around this part of the middle turbinate and this visible discharge may persist for some time. It is very probable that the repeated colds from which these patients suffer are not fresh attacks, but rather exacerbations of an already existing nasal empyema. A patient that has a collection of fluid in one or more of the accessory sinuses generally suffers from what he considers to be a succession of colds in the head. During the warm months or in an atmosphere that is practically free from germs, the nasal empyema may give only slight annoyance, but during the colder weather, or in unhealthy surroundings, it will be the cause of a persistent catarrhal condition of the upper respiratory tract. The presence of this inflammatory condition in the cells renders the patient more susceptible to attacks of acute rhinitis from infection, but by far the greater annoyance comes from increased secretion, which resembles a cold in the head, and which may last from a few hours to several days. This increase of secretion may be the result of anything that causes congestion, such as indigestion, constipation, draughts of air, wetting the feet, dust- or smoke-laden atmosphere, menstruation, etc.

It is just this class of patients that have chronic catarrhal inflammation of the middle ear and in whom the deafness is made worse by each increase in the inflammatory condition of the nose or naso-pharynx. The enlargement of the posterior end of the middle turbinate, which I have described, is constantly present in these cases and I have been able to tell by the presence or absence of inflammation in this part of the nose, whether the deafness was worse or better. The increase of the deafness is coincident with the increase of the inflammation of this part of the nose and it may precede the increase of the post-nasal discharge, probably for the reason that the congestion from the increased inflammation extends to the Eustachian tube at once, while the same congestion

may lock up the discharge for several days. I am convinced that the malformation of the middle turbinate, which has been described, is the predisposing cause of the nasal empyema which produces a large percentage of the cases of post-nasal catarrh and catarrhal deafness. The reasons for this conclusion are briefly, that it practically always exists in cases of post-nasal catarrh, that an inflammation here precedes by a few days or is coincident with an increase of the inflammatory process in the naso-pharynx and middle ear, that it is often the only part of the nasal cavity which is inflamed in cases of acute rhinitis, that it is often possible to see the secretion flowing down around this part of the middle turbinate, and finally that it is possible to cure long-standing cases of post-nasal catarrh and relieve the ears from the danger of repeated attacks of inflammation, by the removal of enough of this malformation of this middle turbinate to give good drainage to the cells which may be diseased.

If the predisposing causes exist what is necessary to establish a nasal empyema? Unquestionably bacterial infection. According to Hajek every inflammation of the accessory sinuses, either acute or chronic, is due to this cause. We will briefly pass in review the different diseases during the course of which infection of the accessory sinuses may occur. Among these diseases acute coryza takes the first rank on account of the frequency of its occurrence. While it cannot, as yet, be demonstrated with certainty that the so-called cold in the head is due to bacterial infection, nevertheless its evident contagiousness, its clinical course, complications, and sequelæ leave no doubt but that such is its origin.

Next in frequency to acute coryza comes influenza. Weichselbaum was the first to demonstrate the influenza bacillus in accessory sinus disease. Later Lindenthal found the influenza bacillus almost constantly present in the accessory sinuses during the course of influenza and he found that it alone was sufficient to produce pus without the admixture of any other bacteria. Lindenthal was also led to believe from his investigations that in many of the cases where other bacteria were found with the influenza bacillus, that they were a secondary infection.

Next in frequency after influenza come croupous pneumonia, scarlet fever, diphtheria, measles, typhoid fever, facial erysipelas, cerebro-spinal meningitis, variola, etc. (Hajek).

Fränkel has called attention to the frequent occurrence of accessory sinus disease during the course of croupous pneumonia, and his researches, together with those of Weichselbaum, clearly establish the connection between the two diseases. Fränkel also found the pneumococcus of Friedlander in the normal accessory sinus.

The relation of diphtheria of the throat or nose to sinus disease presents itself in one of two ways—either there may be a true diphtheritic membrane formed in the accessory sinuses, particularly in the antrum (Weichselbaum, E. Fränkel, Dmochowsky), or the sinuses may be intensely inflamed during the course of the diphtheritic attack without true diphtheritic infection, the inflammation in these cases being due to a secondary infection by other bacteria (Zuckerkindl).

The relation between facial erysipelas and sinus disease has been observed and reported by Zuccarini, Weichselbaum, Zuckerkindl, Killian, Grünwald, Hajek, and others. Whether the facial erysipelas or the sinus disease is the primary disease has not as yet been settled. It is quite probable that one may be the primary disease in one patient and the other in another. The other bacteria most often found either alone or accompanying the influenza bacillus, in accessory sinus disease, are the staphylococcus pyogenes aureus and albus, the streptococcus pyogenes and the bacillus coli. (Weichselbaum, E. Fränkel, O. Lindenthal.) Whether the inflammation of the accessory sinuses occurring during the course of the above-mentioned diseases is due to the primary or to secondary infection by other bacteria, has not as yet been definitely settled only so far as relates to pneumonia, influenza, and diphtheria.

The frequent occurrence of nasal empyema as a sequel of scarlet fever and diphtheria is very noticeable. Equally so is the empyema following what is evidently a purulent rhinitis in children. Children may have a purulent rhinitis even from birth, as, perhaps, the nasal mucous membrane may be

infected in the parturient canal. Those cases which are not infected at that time generally suffer from infection sooner or later. This is so common that it is expected as a matter of course by the parents that the child will have a nasal discharge, and some parents are alarmed if the child does not, thinking perhaps that it is not like other children. This infection is not to be wondered at when we remember the perfect indifference with which the child puts everything into the nose or mouth. The regurgitation of the contents of the stomach, a part of which often comes through the nose, may be another source of infection. The child has relatively a much smaller passage through the nose than the adult, and this, together with its inability to clear the nose, increases the liability of the establishment of a purulent discharge. As these patients reach the age of puberty the increased breathing space in the nose and throat, and often the atrophy of the adenoid tissues, in the naso-pharynx, gives better drainage, and many of them recover. All, however, are not so fortunate, as the history of many cases of post-nasal catarrh will show.

In every case of acute rhinitis, from whatever cause, the accessory sinuses are involved. The inflammation results from an extension of the disease of the nasal mucous membrane by continuity of tissue, and it would be very hard to understand why this extension should not take place. The accessory sinuses are really a part of the nasal chambers and why, it may be asked, should an inflammation reach a certain arbitrary line and refuse to go farther?

A description of Rome which failed to mention the Forum would hardly be considered complete and a mention, at least, should be made of adenoids before leaving the subject of the predisposing and exciting causes of nasal empyema. This condition has been more closely studied than any other disease of the naso-pharynx, because it was early demonstrated that the presence of adenoid tissue in the naso-pharynx had a direct causal relation to ear disease in children. It is quite possible that the brilliant results obtained by the removal of adenoids may have led us to overlook other disease conditions which are of importance.

I wish at this time to call attention to a few erroneous beliefs which are prevalent in regard to adenoids. The first of these is the explanation that adenoids cause ear disease by obstruction to nasal respiration; every otologist of any experience knows that it is the location of the adenoid tissue around or in the Eustachian tube, and not the obstruction to nasal respiration, which produces the ear disease. Again, in regard to suppurating adenoids, that the uneven surface of an adenoid growth may retain pus or mucus, or that the removal of this tissue may lessen the amount of the discharge, or perhaps stop it entirely, no one denies; but that this suppuration originates in this tissue I do not believe: *a*, because the suppurative process would at once break down and destroy the soft tissue of an adenoid growth; *b*, because the discharge does not cease at once after the removal of the adenoid, as it undoubtedly would if this tissue were the seat of the suppuration. The explanation of the collection of pus on the surface of the adenoid tissue is that the situation of the growth high up in the vault of the pharynx, and often in the posterior nasal chamber, interferes with the drainage from the posterior ethmoid cells and the sphenoid sinus, and we have in addition to the adenoids an empyema of these cells.

Lastly, in regard to those cases of adenoids where the operation for their removal is a success, but the patient is not relieved. In this class of cases I have found the malformation of the middle turbinate, which I have described in this paper. Since I have been alive to the importance of this condition I have made it an invariable rule to examine for it every case of adenoids, and, when found, to give a guarded prognosis, *i. e.*, I have told the parents that the removal of the adenoids was the first step to be taken, and that the operation might improve the drainage to such a degree that nothing more would be required, but that there was disease of the nose which might still give trouble. I have found that the parents were much better pleased to know this before than to learn of it after they found that the operation was not a complete success.

Treatment: This will of course vary with the condition

found and the length of time which the disease may have been in existence. A large proportion of the acute cases, practically all of the lighter ones, will recover without any treatment or even with treatment which is distinctly injurious and it is only with the chronic or those acute cases which are very severe that we need concern ourselves at the present time. In general these cases may be said to have received inefficient rather than insufficient treatment. There are always two things to do in the management of these cases, one is to remove the discharge, and the other, which may be called the principal one, to improve the drainage to such a degree that the affected cavity will heal.

The removal of the secretion is not always the simple matter that it appears to be. The secretion is very often concealed by the middle turbinate and, to remove it, it is necessary to shrink the nasal mucous membrane and then to introduce a small canula between the middle turbinate and the nasal wall and wash out the accumulation. If the secretion is above the middle turbinate, it should be washed out by placing the canula in the upper meatus. The ordinary spraying of the nasal cavities is almost absolutely useless as a curative agent. After the secretion is removed it is often possible to see small masses of granulation tissue around the openings of the sinuses, which are the result of the inflammation within the cells. This granulation tissue may be the cause of the stenosis, or it may be the source of some secretion, and its removal by cauterization or by the curette is often all that is required to effect a cure. The thorough washing and the removal of granulation tissue should be given a fair trial before proceeding to more heroic measures; for, contrary to accepted belief, the nasal accessory sinuses have a strong predisposition to free themselves of inflammation and will often do so with but slight assistance. These are evidently the cases which recover spontaneously or by a change of climate, after a variable length of time. It is always well to keep these patients under observation for some time, because it is a well-known fact that a diseased accessory sinus may remain free from secretion for months and then relapse. This may be on account of focal disease

within the cell or on account of the anatomical construction of the cells or the parts surrounding them.

It is needless to add that these simple measures are not sufficient to cure those cases in which the drainage from the cells is interfered with by more permanent forms of obstruction. I shall not discuss the surgical treatment of nasal empyema in detail, except in so far as it relates to the malformation of the middle turbinate which I have described in this paper. **In general, surgical treatment of nasal empyema should aim to restore the nasal chambers to as near their natural condition as possible.** To help nature and not to improve her should be the end sought by the rhinologist. It should make no difference to us whether we can understand why the natural openings of the sinuses are at or near the top of the cavities or not. It is safe to assume that those openings performed their functions so long as they were free from obstruction and as a rule we shall not improve the situation by making others, unless there is extensive diseased tissue which must be removed. Even in these cases the natural openings should be freed from obstruction, because it is a noticeable fact that the artificial openings are not maintained for any length of time and the drainage from the cavities again takes place through the openings provided by nature. Again there is every reason to believe that focal disease of considerable extent, within the cell itself, will gradually heal if the natural drainage is made perfect. All focal disease will not disappear in this way, but it is always well to wait a time for nature in cases in which the urgency of the symptoms does not demand immediate operative measures. This advice applies to the further extensive operative measures after the obstruction to the free drainage from the cells has been removed. On the other hand it is useless to wait for atrophy to take place to improve the drainage in those cases in which the drainage from the cells is interfered with by a diseased or badly placed middle turbinate. The diseased middle turbinate and the diseased tissue around it should be removed without delay and the cells which are uncovered by the operation should be curetted. In the cases in which the middle turbinate is so closely

applied to the nasal wall that a probe can only with difficulty be inserted between them, enough of the middle turbinate should be removed to give free drainage, for even if atrophy does take place in ten or fifteen years and so improve the drainage, the post-nasal catarrh which is caused by the obstructed drainage has in that time usually done all the harm that was possible, and so far as the ears or the general health of the patient are concerned the cure has come too late. The same holds true in regard to the special malformation of the middle turbinate which I have described. It is necessary to remove enough of this to free the drainage. I have usually operated under cocaine with a small pair of Grünwald's forceps. It is not necessary to remove the whole of this part of the middle turbinate, but if there is a cell in the enlargement, as there usually is, it should be broken into. In a few cases the space available to operate in is so small that it is impossible to reach the part to be removed with the forceps or the middle turbinate may be so closely applied to the nasal wall that it is impossible to introduce a blade of the forceps between them. In these cases I have often succeeded in introducing a small saw and by sawing into the turbinate have made room for the blade of the forceps. Various expedients will readily suggest themselves to the operator.

If the assumption is correct that post-nasal catarrh is a symptom of nasal empyema and not a disease *per se*, then it is evident that it will be cured by the healing of the accessory sinus disease on which it depends. In attempting to prove this by a summary of cases which have been treated by improving the drainage from the accessory sinuses, I must of necessity rely upon the records of my own cases, as I am not aware that any cases have been reported which have been treated on these lines.

Within the last two years I have operated on 231 cases for the relief of chronic post-nasal catarrh; 123 of these cases had deafness of varying degree. Of these cases, 84 were operated on during the first year in which I did any work on these lines, and as a year or more has elapsed since they were treated we will analyze these cases for the reason

that the relapse of the disease can be better eliminated. Of the 84 cases,

78 had the enlargement of the posterior end of the middle turbinate.

23 of these cases had in addition diseases of other parts.

6 of the 84 cases had no enlargement of the posterior end of the middle turbinate, but did have obstruction to drainage around the anterior end.

The result of the operations to improve the drainage in the 84 cases was:

49 of the cases of post-nasal catarrh were permanently cured.

20 cases suffered relapse, but were finally cured.

7 were much benefited, but not cured.

8 were not benefited.

I have included in these records those cases which are known as post-nasal catarrh and have excluded those in which there was apparent extensive sinus disease. These cases were not included for the reason that there was no discharge into the naso-pharynx, but because they are usually classed as sinus disease, and not as post-nasal catarrh.

In regard to the effect upon the catarrhal inflammation of the middle ear which the relief of the post-nasal catarrh affords, in general, it may be said that it keeps pace with the condition of the naso-pharynx, although the improvement of the aural condition is much slower than the improvement of the condition of the naso-pharynx. It is evident that even after the source of infection has been removed, that some time may be necessary for the inflammatory process in the middle-ear cavity to subside. I have records of many cases in which the improvement in the hearing was immediate, but as a rule it is slow but fairly constant until the limit of improvement for each case is reached. A good rule for prognosis is this: by the cure of the post-nasal catarrh the hearing can be improved to nearly the hearing capacity which the patients enjoy under the most favorable conditions, *i. e.*, in regard to climate and freedom from post-nasal catarrh, and that this improvement can be held. It is

not claimed that the hearing is improved in all cases, for, of course, no one expects the hearing to be much improved if pathological changes of any extent have taken place in the middle-ear cavity. What is claimed is this, that those cases of chronic catarrhal inflammation of the middle ear which depend upon or are made worse by chronic catarrhal nasopharyngitis can be prevented from growing worse, *i. e.*, freed from the danger of repeated exacerbations of the inflammatory process, by the treatment of the post-nasal catarrh on the lines which I have laid down. I have gone as fully into this subject of post-nasal catarrh as the limits of a journal article seem to permit. If I shall have directed attention to a new line of thought in regard to these cases, I shall be content.

In closing I wish to call the reader's attention to the following conclusions :

1. That the whole chain of catarrhal symptoms of the nose, the naso-pharynx, and of the ears is due to empyema of the nasal accessory sinuses.
2. That this empyema is the result of an infective inflammation of the accessory-sinuses in which the drainage is insufficient.
3. That the malformation of the posterior end of the middle turbinate which I have described in this paper plays an important part in the establishing of the nasal empyema which causes post-nasal catarrh.
4. That chronic catarrhal inflammation of the middle ear may result from the catarrhal condition of the naso-pharynx, either by extension of the disease, by continuity of tissue, by the forcible blowing of the irritating secretion into the middle-ear cavity, or by closure of the Eustachian tube from involvement of the mucous membrane in or around its entrance.
5. That there is no evidence that chronic catarrhal inflammation of the middle ear is caused by obstruction to nasal respiration, unless the obstruction is associated with empyema of the accessory sinuses.
6. That those cases of chronic catarrhal inflammation of the middle ear which are caused or made worse by nasopharyngitis cannot be cured until the nasal empyema which

causes the naso-pharyngitis is first cured, and that mechanical treatment directed to the ears is only palliative and does not free the patient from the danger of an acute exacerbation of the disease.

7. That many cases of nasal empyema may heal spontaneously under favorable conditions, and the more recent the case the more probable it is that this will occur.

8. That the accessory sinuses have a tendency to free themselves of inflammation, and that treatment should be directed to assist nature to this end.

9. That it is possible to cure practically every case of nasal empyema and therefore every case of naso-pharyngitis depending on it.

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THREE CASES OF DIABETIC MASTOIDITIS.

BY PROF. E. P. FRIEDRICH, KIEL.

Translated and Abridged by Dr. MAX TOEPLITZ, New York.

CASES of aural disease due to diabetes have not been frequently reported and then almost exclusively by Koerner, who has published four observations. This apparent rareness is contrasted by the fact, that during the course of the year 1898 I have seen and operated three cases of this kind, which are now fully reported, and confirm the views of Koerner on primary mastoiditis of diabetics.

The three cases are as follows:

CASE 1.—Agent, aged fifty, well developed, has for years suffered from diabetes; the amount of sugar never exceeded one or two per cent. to the utmost and was easily suppressed by dieting.

On January 20, 1898, he was seized with ear- and headaches in the left side, associated with intense sensibility upon pressure over the mastoid apex. I found the surrounding parts of the outside of the ear unchanged, the mastoid apex quite painful upon pressure, the soft parts of the external auditory meatus swollen, but without secretion. The drum membrane was swollen, its surface softened, gray-red, except at a dark-red bullous bulging in its upper posterior half. Whispered voice: R normal; L—o; B. C. not decreased, and more accentuated towards the L E; low T. F. extremely, high T. F. less, decreased.

Upon paracentesis, a thin, sanguinolent fluid continued to escape during the following days, while the pain decreased. However, on January 26th, after cessation of discharge, it increased, in

order to decrease again after another paracentesis. The examination of the urine yielded with Fehling and Nylander a slight reduction only, owing to the strict sugar diet of the patient from the beginning of the present disease.

Until February 1st, the subjective symptoms had more and more abated, the sensibility upon pressure upon the mastoid had ceased, the external meatus was free; the second paracentesis, however, had been followed by persistent profuse suppuration. This condition remained unchanged for several weeks, until, towards the end of February, with dull headache and sleepless nights, the upper wall of the external auditory meatus was sinking, without external changes of the mastoid and without sensibility upon pressure. There was no sugar demonstrable. On February 28th, he was operated under chloroform. After exposing a discolored portion of the mastoid planum, from which chiselling was carried out, a widely branched system of pus containing osseous cells with a few granulations was laid bare. The bone was of dirty gray color, brittle and partially sequestered, and was removed with spoon and rongeur as far back as the sinus, and downward to the extreme end of the mastoid apex. The antrum was spacious and filled with pus. With preservation of the tympanic ring and the ossicles, a wide opening was made into the recessus epitympanicus. The wound was left open.

On the day following the operation, the amount of sugar increased to 1.85 per cent., but disappeared after two days. The course of after-treatment was retarded by the detachment of a sequestrum from the tegmen tympani. The membrana tympani was cicatrized on March 8th, after entire cessation of suppuration after the operation; end of May, 1898, the wound closed; hearing faculty for conversation is preserved.

CASE 2.—Sch.'s wife, aged forty-six, was admitted to the aural clinic at Leipzig on October 10, 1898.

The robust patient suffered for two weeks from an acute suppuration of the left ear, and for a few days from intense pain behind the ear. The left external meatus was filled with pus and the posterior wall bulging, the mastoid process sensible upon pressure, its soft parts slightly infiltrated. Whispered voice, L 16". The examination of the urine yielded 5.85 per cent. of sugar.

A medium diabetic diet was instituted and the operation postponed. Since on the following day the swelling of the upper wall of the external meatus had so much increased as to obstruct

the entire lumen of the external meatus, and the infiltration over the mastoid had also considerably increased, the operation was performed on October 12th.

The narcosis was instituted with chloroform and continued with ether. After chiselling the cortex, slightly offensive pus emanated from a large bone cavity, with brittle discolored walls, communicating with the spacious antrum, which contained as small a number of granulations as the recessus epitympanicus and the middle ear. The posterior osseous wall of the external meatus was carious and contained here and there small cavities filled with pus. The mastoid process was abundant in cells, the bone brittle, gray-brown, without much pus in the cells. The radical operation was completed by the formation of Koerner's flap. The wound was sutured in the evening. T. 37.2° C.

October 13th.—2.42 per cent. of sugar. Vomiting, lack of appetite, thirst, refusal of solid food. Evening T. 37.2° C. Quantity of urine, 2200 ccm.

October 14th.—Change of dressing in the evening. The lower angle of wound was reddened and swollen, and pus discharged after removal of two sutures. Quantity of urine, 3100 ccm.

October 15th.—Since preceding night, deep, labored breathing, with the picture of beginning *diabetic coma* of dyspnoeic character. Under slight dulness, the patient answered questions correctly with slow, scanning speech, but was otherwise completely apathetic. Pulse was small and accelerated. The somnolence increased during the day more and more, leading to complete loss of consciousness. The breathing became more labored, loud, and rapid. At noon, T. 36.0° C.; evening, 38.9° C. Quantity of urine, 800 ccm.

Death October 16th at 2 A.M.

The autopsy, made at the Pathological Institute of Leipzig, revealed: Intense oedema of the soft meninges and a markedly firm brain. From the suppurative wound at the left mastoid process a *phlegmon of the superficial cervical muscles* extended down to the clavicle, and laterally from the left lobe of the thyroid an encapsulated small abscess was found. The sinus and jugular were free. The lungs presented old pleuritic adhesions, extreme hyperæmia of both lower lobes, and oedema of the upper ones. The heart showed a dilatation of both ventricles and pale myocardium in fatty degeneration. Atrophy of pancreas, hypertrophied kidney with cortex in fatty degeneration, and dull swelling of spleen and liver completed the picture.

CASE 3.—Merchant, æt. forty-two, was admitted on December 18, 1898, to the aural clinic at Leipzig.

Patient, an inveterate drinker, was seized two years ago with supuration from the left ear, which persisted ever since with varying improvements and aggravations. On December 11, 1898, he suddenly became worse, with simultaneous pain and swelling behind the ear, forcing him to call for admission to the hospital. The robust patient had a small, irregular, unequal pulse. The urine contained albumen and five per cent. of sugar, as was accidentally found.

The *left* maxillo-mastoid fossa was filled out by an elastic, uniform swelling, which extended upward over the mastoid process to the temporal line and down the posterior edge of the sternocleido-mastoid muscle, with reddened skin and deep-seated fluctuation. The walls of the external meatus were diffusely swollen, the membrana tympani invisible, and profuse non-offensive purulent discharge issued from the ear. The radical operation was not performed owing to the high percentage of sugar and the weak heart action.

On December 19th, the abscess was incised, under local anæsthesia, with an ether spray. The incision was made from the mastoid apex forward and downward, and reached the abscess only very far inward, when a large quantity of pus escaped. The abscess cavity extended far forward and downward; the probe met upward rough bone at the mastoid apex. During the after-treatment the daily quantity of sugar varied between $\frac{1}{2}$ and $1\frac{1}{4}$ per cent., and the quantity of urine between 1000 and 1500 *ccm.*, and, one day only, 1800 *ccm.* The action of the heart continued to be weak, the urine contained much albumen, and, in addition, profuse diarrhœa appeared.

On December 28th the patient left the hospital; the wound discharged pus profusely during the following weeks, the soft tissues remained infiltrated even after the incision was closed, and the otorrhœa ceased at times.

The serious aspect of aural disease in diabetics is the rapid extension of osseous caries, which should be early and extensively removed. During the operation it is found, as a rule, that the subjective and objective symptoms of the patient are out of proportion to the extreme extent of the disease. Early operations are often followed by difficulties based upon the nature of diabetes mellitus.

The danger from operating on diabetics consists in the subsequent appearance of sepsis and coma. Both complications depend upon the amount of sugar and the acidity of the urine, which, when found together to a high degree, form a contra-indication of the operation.

The danger from sepsis is greater in aural operations which present septic wounds and often give rise to mixed infections, owing to the communication of the pus from the diseased osseous parts with the external meatus through the middle ear. The above reported second case illustrates the rapid development of a burrowing abscess along the superficial cervical fascia.

The appearance of diabetic coma is not due to the operation or to shock, but to the narcosis. In some of Becker's cases it did not set in until the second day after the operation. The kind of narcotic used is not of so much importance as the metabolic change thereby produced through the increased acidity. This is well illustrated by my second case, while the first one presented an increased amount of sugar on the day following the operation.

In all cases in which the aural disease requires an early operation, the general health of the patient and the condition of his circulatory apparatus, lungs, and kidneys should be considered. In the third case, the nephritis associated with myocarditis and arterio-sclerosis forbade the operation in narcosis.

In some cases it is difficult to determine the proper treatment, since a serious aural disease, which urgently requires an operation, is complicated with a constitutional disorder which may eventually lead to a fatal issue.

The operation of the robust woman of our second case was a mistake, and its unfavorable course may serve as a warning to be cautious in future cases, but not restrict us from all operations, since simple incisions, as in the third case, are in themselves not of great importance.

In touching briefly upon the question, how in future similar cases the fatal issue may be avoided, the omission of the narcosis as the greatest danger would be most important in the treatment of diabetic mastoiditis. It is to

be regretted that the results of local anæsthesia are not as yet good enough to consider its use except in severe cases.

Naunyn's suggestion of the administration of bicarbonate of sodium as a prophylactic in operations on diabetics, in addition to a regulated diet before and after the narcosis, in order to avoid the intoxication with acids and the danger of the appearance of coma, is to be commended.

SHARPLY CIRCUMSCRIBED SOUND-DEFECTS
IN THE HEARING-FIELDS OF
CERTAIN DEAF-MUTES.

BY DR. A. SCHWENDT,

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Translated and Abridged by J. GUTTMAN, M.D.

CASE I.

THE seven-year-old deaf-mute, Albert T., became deaf at the age of seven months in consequence of an attack of meningitis. The right eye is completely blind.

Both drum membranes are about normal.

The patient is absolutely deaf in his left ear; on the right side, however, there is a fair amount of hearing, especially for the middle octaves. The right ear can quite well distinguish all vowels.

The lower limit of his hearing power lies at small c, the upper at h'.

The most peculiar feature in this case is a sharply defined deafness for the note f', whereas c' and g' are clearly heard. This tone-defect is best demonstrated with the aid of Koenig's high tuning-forks c'-f', which are accurate instruments and produce very high notes.

We cannot as yet decide whether the note f' could be heard or not, if it were produced with greater intensity.

If these notes are produced with the newly improved Edelmann's Galton whistle, we find that the mark 13.6, which corresponds to the note f', can be heard only in the immediate vicinity of the ear. It follows that so close by

the ear he perceives either the harmonics of f' or only a tactile sensation.

This deaf-mute can hear at a greater distance the notes which are produced by the prolongation or shortening of the whistle.

CASE II.

The nine-year-old deaf-mute, Charles S., became deaf in his third year in consequence of influenza. He is absolutely deaf for the upper half of the scale. His hearing power is about equal in both ears. The lower limit of his hearing lies in both ears at contra C, the upper limit right at f' , in the left at a' .

He cannot distinguish vowels but he can hear them if they are shouted.

The only consonant which this deaf-mute can recognize is the lingual R.

His field of hearing, *e. g.*, the duration of his perception of the note c, as expressed in percentages of the normal, is :

	Right Ear.	Left Ear.
c^5	0	0
c^4	0	0
c^3	0	0
c^2	0	0
a^1	10 %	10 %
c^1	30 %	70 %
c	33 %	72 %
C	34 %	80 %
C^1	50 %	80 %

Both cases demonstrate the sharply limited defects of hearing power for certain notes or for certain parts of the sound scale, which is often met with in cases of deaf-mutes, or in persons who have some affection of hearing.

This second case contrasts sharply with the following case of deafmutism.

CASE III.

A twenty-one-year-old girl became deaf in consequence of an attack of meningitis and is completely deaf in her right

ear. In the left, the upper limit lies immediately above g^2 . She possesses comparatively good hearing power for the notes below g^2 ; for the notes above that point she is completely deaf.

Her duration of hearing as expressed in percentages of the normal is as follows :

	Left Ear.
c^2	0
c^1	0
c^2	0
b^2 a^2 h^2	a high limit
c^2	50 %
c^1	95 %
c	65 %
C	60 %
$C-1$	60 %
$D-2$	low limit

The upper limit varies between b^1 a^1 and h^1 according to her daily disposition; when she becomes tired, the duration of tone perception as well as the acuteness of hearing of speech is diminished. In her ordinary disposition she can hear in the immediate vicinity of the ear moderately loud conversation; if the conversation is too loud she is annoyed by it and says that she cannot understand it as well. In contrast to our deaf-mute, Charles S., she has a comparatively good hearing power for the octave g^1 - g^2 .

Charles S., can hear of the consonants only the lingual R; the girl on the other hand can hear all consonants with the exception of S. Our deaf-mute Charles S. constitutes a contrast also to the two deaf-mutes demonstrated by Bezold at the Naturforscher-Versammlung at Munich. These two had a good hearing power for low notes, but only a very short duration of hearing for the notes g^1 - g^2 . In spite of this they could hear speech quite well, although for the hearing of speech a much longer duration of hearing for g^1 - g^2 is required. The perception of the low notes had in this case evidently a favorable influence upon the perception of speech.

Bezold explains this phenomenon by the aid of the Helmholtz-Hensen theory as modified by Ebbinghaus. According to Ebbinghaus, the fibres of the membrana basilaris which are intended for the low notes come into oscillation not only by the original note to which they are tuned, but also by the harmonics through formation of nodules. In this way only can we explain the peculiar phenomenon which we observed in the patients demonstrated by Bezold.

MULTIPLE RAREFACTION, "SPONGIOSIRUNG,"
OF THE LABYRINTH-CAPSULE FOUND AT
THE AUTOPSY OF A CASE OF PROGRES-
SIVE DEAFNESS.

BY PROF. F. SIEBENMANN, BÄLE.

(With eight illustrations on Plates I.-VI. of Vol. XXXIV., No 4, German Edition.)

Translated by Dr. ARNOLD KNAPP.

ONE of the two cases described by my pupil, Edward Hartmann, in vol. xxx., p. 1, of the *Zeitschrift für Ohrenheilkunde*, was of especial interest because v. Tröltsch had made the diagnosis of nervous deafness from the functional examination (markedly diminished bone-conduction). At the autopsy and microscopic examination bony ankylosis of both stapedii and an extensive rarefaction of the bony labyrinth-capsule were found present, and on again looking over the specimens, I discovered a considerable exostosis in the lower parts of both scalæ. Nerve bundles and ganglia of the auditory nerve and Corti's organ seemed normal. The bony canals of the tractus ganglionaris and of the tractus foraminulentus were contracted.

Another case of deafness where I had made a functional examination, and later a post-mortem investigation of both auditory organs, enables me to conclude that extensive rarefaction of the labyrinth-capsule is sufficient, independent of an involvement of the bony nerve canals, to produce a decided diminution of bone-conduction. It shows that the same process, according to the localization, may produce a bony stapes-ankylosis or progressive nerve deafness with correspondingly different functional findings. This micro-

scopic condition is interesting from another view point and is, in fact, unique, as in both labyrinth-capsules—in the cochlea as well as in the semicircular canals—a large number of isolated foci existed. These specimens can decide in a definite manner the previously unsolved question on the origin and further development of these pathological rarefying processes.

K. S., female, fifty-two years old, was admitted to the hospital on December 30, 1896. Except for an eczema of the arms, patient has always been well. One month ago an attack of sciatica, then frequent chills, nausea, and fever. The clinical diagnosis of endocarditis ulcerosa was made. She died on January 5, 1897, and at the autopsy the following conditions were found: Endocarditis ulcerosa, myocarditis, miliary abscesses of pia and cortex, hemorrhagic infarct of the spleen, infarct and abscesses of the kidneys, miliary abscesses in the submucosa of the stomach and intestines, abscess of the left thyroid gland, parotitis, embolic hemorrhages of the larynx and trachea.

I was able to examine the patient on December 31st. She stated that she had gradually become deaf in the last few years. There had been no otorrhœa, but frequent pain in the ears. In recent years attacks of vertigo without vomiting occurred, which would necessitate lying down. As regards heredity, the father had been very deaf; the other relatives, however, had normal hearing.

The examination, on December 31st, revealed normal drum membranes. Whisper was heard right at 4 cm; left, 150 cm. Fork a' was lateralized from the vertex to the left (the better) ear, and was shortened ten seconds. Rinné a' positive on both sides, right approximately of normal duration (about twenty-five seconds); left not crossed (not carried over to the right ear); A perceived on both sides even on slight impulse. Owing to the critical condition of the patient the examination could not be prolonged; the determination of E Rinné left, and the upper and lower tone limits had to be given up. The diagnosis of bilateral progressive nerve deafness seemed justified.

Twenty-four hours after death we examined the two temporal bones, and macroscopically the external and middle ears seemed normal. The labyrinths were freed, and the superior semicircular canal opened; they were placed in

formol, dehydrated, decalcified in hydrochloric acid, imbedded in celloidin, and finally cut into about three hundred vertical sections, in the plane of the superior canal. Every tenth, and, in the region of the oval window, every fifth section were stained with eosin-hematoxylin; later, control sections were stained with neutral carmin, picrocarmin, hematoxylin carmin, and according to Weigert-Pal. Very beautiful pictures were obtained by overstaining with carmin, then hematoxylin, and decolorizing with a watery solution of picric acid plus a trace of hydrochloric acid (one-half per cent.).

The following interesting conditions were found and are reconstructed into Figs. 1 and 4:

a. Right labyrinth (the lateral extremity, *i. e.*, the vertex of the lateral and posterior canals, is wanting): the nerve and membranous labyrinths seemed normal. In each of the two bony semicircular canals, partly preserved in the specimen, there was a focus of rarefaction, a third focus was found at the oval window, a fourth at the stapes plate, a fifth and sixth at the cochlear capsule (see Fig. 1).

The first focus extends from the canalis subarcuatus to the inner (concave) wall of the upper semicircular canal in its vertical portion and is adjacent to the endosteum; it partly limits the ampullar extremity in front but does not invade the ampulla itself. To the medial side of the superior canal the first area terminates abruptly, on the lateral side it extends farther than is seen in the specimen. Posteriorly, it connects by means of prolongations with the second area which is situated on the ampullated end of the posterior canal.

The third area surrounds the oval window above, below, and in front so that the posterior half of the lower margin and the posterior portion of the window remain free. A freely vascularized periosteum is situated beneath the mucous membrane of the window niche as far as the bony changes extend.¹ On the inner side this area extends over

¹ The fact first advanced by Schwartze and verified by various authors, that the labyrinthine wall of the middle ear especially in peracute cases of sclerosis shines reddish through the drum membrane, is probably due to unusually increased vascularity of these bony parts and to the change of the thin mucosa into vascular thick periosteum. I have observed this condition frequently in youthful individuals, in purely progressive nervous deafness and not alone in stapes-ankylosis.

and in front of the window so that it directly forms a portion of the facial canal wall, and of the nervous utriculo-ampullaris of the pyramid and of the crista vestibuli; a part of the bony cochlear wall is involved, especially the wall opposite to the vestibule, as well as the vestibular and the tympanic scala and the portion corresponding to the area between the basal and middle turns. The upper fourth or third only of the labyrinth wall situated between the oval and round windows shows rarefaction. As to the rarefaction of the window margin it is converted into rarefied or osteoid tissue, except a part of the lower circumference of the cartilage; the annular ligament is decidedly diminished. On the vestibular side the window margin is replaced by a rarefied wall which above and in front surrounds the edge of the stapes plate on both sides; it resembles in thickness and structure true vascular periosteum. The more recent tissue is found in the superficial layers of this osteophyte. It is osteoid in character and takes on a deep blue stain. The free surface under the periosteum is uneven, rough with coral-like projections, and the intervening spaces contain a homogeneous pinkish staining mass similar to that in the deeper layers of the periosteum. The window niche is somewhat contracted.

The stapes plate is not thickened, but its vestibular cartilaginous covering is converted into bone in the middle (fourth area).

The fifth and sixth areas are in the cochlea. Both are situated deep and do not approach the tympanic mucous membranes. The fifth has a flat, sausage-like form and is situated in the tympanic wall of the tympanic scale at the basal turn (at its lower and inner part, see Figs. 2 and 3); it forms toward the vestibule the lower and toward the cupola the outer cochlear wall and also the lower margin of the int. audit. meatus, somewhat altered by osteophytic proliferation. The endosteum of the cochlea does not show any thickening at this point, but in the places where the spiral ligament is covered with rarefied bone there are several osteoid homogeneous plates or bone corpuscles intensely stained with hematoxylin. The two small extremities of the area do not reach the cochlear canal. The bone is normal

in the area of the tractus foraminulentus; the above-described changes in the wall of the meatus are situated to its outer side.

The sixth area (Fig. 3) is likewise situated at the limit between the upper and lower part of the basal turn; it covers the latter in the vestibular scale, approaches the middle turn, and extends for a short space in the direction of the apex without invading the cochlear lumen.

The only connection between the areas is a slight one between the first and second. The remaining four are isolated.

A description of the structure of the spongiosa and its varying condition at different places will be given later after the left temporal bone has been described.

b. Left temporal bone (all of the semicircular canals are well preserved in the specimens); see Fig. 4:

The nerve and bony labyrinth are normal. The bony canals of all three circular canals are surrounded by an area of rarefaction (see Fig. 5); the ampullæ are free. The lateral canal is the least affected where the middle of the crus simplex shows the above-described changes on the upper surface. The posterior canal is principally affected, especially in its entire length. Of the superior canal (Fig. 6) the ampullated extremity is chiefly involved, and especially at its inner surface and its concave (inner) edge.

The fourth focus is situated about the oval window, and has about the same shape as area three of the right labyrinth, though it is somewhat more extensive. At the posterior upper window margin the bone is rarefied but the cartilaginous margin is unaffected; the posterior lower part is normal both as to bone and to cartilage. Otherwise the cartilage is everywhere replaced by spongiosa. At one place (see Fig. 7) the ligamentum annulare and the lower stapes margin are converted into spongioid bone, which without interruption passes over into that of the lower window margin (bony stapes-ankylosis). At other places, the stapes presents its normal cartilaginous margin. The upper stapes margin is dislocated externally, in its anterior part by the osteophytic hypertrophies and the consecutive narrowing of the window

(see Fig. 7). The pelvis ovalis is deepened and narrowed by the proliferation of bone. The focus extends into the depth between the vestibule and the middle turn of the cochlea, limiting the latter and just touching the apex extending to the fundus meatus without involving the endosteum of the basal turn or the canal of the modiolus. The walls of the facial canal, vestibulum, and of the utriculo-ampullar branch are rarefied similar to the right side. Further foci (like five and six of the right temporal bone) are wanting.

The pathological diagnosis is therefore: *on both sides, areas of rarefaction in the bony capsule of the circular canals, of the vestibule and cochlea. Formation of osteophytes on the vestibula and tympanic surface of the oval window margin. Commencing ossification in the cartilaginous covering of the stapes. Additionally, on the left side commencing ossification of the annular ligament (incomplete stapes-ankylosis).*

The specimen was well preserved and fixed, and was examined in serial sections, so we were able to investigate, 1st, the various developmental stages of this "spongiosa" formation, and, 2d, the origin or starting-point of the process. As to the first question, we can say that the first stage consists of a change in the Haversian canals, inasmuch as they lose the relation of the innermost layer to hematoxylin and carmin, then they enlarge on the labyrinthine side in funnel-like spaces to large lymph cavities by lacunar resorption; multinuclear giant-cells are often present. The round and star-shaped cells of the perivascular lymph spaces multiply, and connected by thin processes to form a loose network, they fill in the space between the bony wall of the cavities and the delicately walled vessels. In a further stage, at those places where the resorption process has ceased, the cells of the peripheric zone are attached as broad shallow osteoblasts to the wall of the cavities, forming a gradually thickening concentric area of decalcified tissue which stains deep red with carmin, violet, and in places, dark blue with hematoxylin-eosin. An occlusion of the space down to the vascular lumen does not occur; the stronger refracting cement-line (Pommer) between the unchanged original and adjacent new bone remains well marked. The two latter areas are

distinctly different at this early period, inasmuch as, apart from the staining differences, the new-formed osteoid zone is marked by less clearness and by numerous coarse *irregular* bone corpuscles which are in part enlarged, and often possess numerous abnormal distinct prolongations as well as one or two very deeply stained nuclei in a light area. *All the Haversian canals and spaces in this affected area are changed by this resorptive and appositional process, and in addition all cartilage containing introglobular spaces (Mannasse-Gegenbauer) are dissolved and replaced by new-formed osseous tissue.* The bone about the cartilaginous part of the labyrinth window—later also of the stapes—is absorbed by large penetrating blood-vessels, and replaced as above described by the spongioid tissue. Bright osteoid plates arranged in chains, at first free from bone corpuscles, stained blue with hematoxylin, appear isolated in the annular ligament; after the cartilage of the stapes and window margin have almost been brought to touch by proliferation of the bony understructure, communicating bridges are formed over this narrow cleft. These are arranged radially, more in a horizontal than vertical plane, and are attached at the innermost point of the window margin, and run together, changed into spongiosa communicating among each other and with the cartilaginous margin or with the bone which takes the latter's place.

In the later periods, the intervening walls of the medullary spaces become thicker and the spaces smaller. The bone tissue stains with hematoxylin-eosin a bright pale red color, and loses, except at the inner zone, its relation for carmin. It is an important fact that the new bone gradually assumes a lamellar structure; the bone corpuscles are arranged concentrically and the nucleus atrophies. The medullary spaces become poor in cells and vessels but richer in fibrous connective tissue running parallel to the axis of the canal. The limiting lines grow gradually less distinct and disappear (as Hanau has described in the epiphyses of the ribs, see Mader, "On Inflammatory Hyperostosis and Periostosis of the Ribs in Pleurisy," *Archiv f. Entwicklungsmechanik*, vol. vi., No. 4). Abnormally active regeneration

and resorption of bone are seen more distinct at places associated with pale red or pale blue zones outlined by sharp lines about the Haversian canals, without the latter undergoing a distension.

The characteristics of the two stages correspond exactly to the pictures which I have observed (in seven similarly diseased temporal bones) either, at the very beginning, as an area of pin-head size, or, after thirty years, changes extending over the entire labyrinthine capsule. I agree with the views of Bezold on the histological conditions.

There is another reason to show that the decalcified carmin zone is new-formed bone, as Pommer and recently Hanau have shown. The osteophytic tissue possesses in every relation the same microscopic structure, and the same in reactions as the carmin zone in the deeper area. In the latter the process of resorption and placing together can be beautifully followed in those places where the advancing resorption line has reached a cartilaginous introglobular space, and a fundamentally different structure is deposited. Small deviations from this order are occasionally seen; old bone may stain a light blue with eosin-hematoxylin instead of red; in the younger parts of bone the bone corpuscles are frequently not unusually dilated or numerous, etc.

After we had verified our conclusions on these histological changes by examining other specimens of osseous tissue, we went over all of the sections again to investigate the local origin of this process. This had the very interesting result that this rarefying process does not emanate from the periosteum (which Bezold at least does not exclude). Nor does it arise originally in the labyrinth capsule (Politzer), but that the *oldest parts occur at the limit between the endochondral primarily formed labyrinth-capsules and to the connective-tissue bone secondarily deposited from the periosteum* (probably in the latter itself). For we find the most recent richly nucleated areas stained deeply with hematoxylin-eosin directly at the endosteum of the labyrinth-capsule; the oldest are situated in the centre of the circular canals, about the entering large bony vessels. In the spongioid focus occupying the space between the oval window, vesti-

bule, cochlea, and facial nerve, the most recent portions are situated at the lower window margin in the superficial layer of the ring of osteophytes on the vestibular surface of the oval window-ledge near the canal for the utriculo-ampullar nerve, while the older parts occupy the centre. The latter is situated somewhat in front and over the anterior margin of the oval window and forms, as other authors have found, the place of predilection for this affection. It is without doubt due to this condition that the osteophytic wall usually is higher in front than in the back, and that the upper margin of the window is more extensively affected than the lower. A more pronounced development of the wall at the posterior margin occurred in Politzer's fifth case. In Bezold's third case the changes in the bone were pronounced posteriorly and below, but no wall was present.

Area five in the right temporal bone is relatively old; the most recent spongiosa is (as in the area described in Bezold's case two) directed to the cochlea, the oldest is situated near the porus acusticus. The entire area six is more recent; one part is, however, older; it is pale red, lamellated, and poor in nuclei, separated by no limiting line from the healthy bone, and situated farthest away from the cochlea and directed to the tip of the petrous bone. There were no exostoses at the lower part of the promontory, as Habermann has described, or in the basal turn, as Politzer saw projecting into the scala tympani of the basal turn (cases five and six), and as were present in the two temporal bones of my collection published by E. Hartmann. No changes were found in the canalis ganglionaris, thus differing from the two latter mentioned temporal bones and case five of Politzer.

It is noteworthy that the spongioid spaces are nowhere so large that it is permissible to speak of an osteoporotic process. In most of the cases there is an active apposition; though there are numerous places where only resorptive processes are visible, especially in the neighborhood of the nerve channels and beneath the endosteum of the labyrinth, *so that the endolymphatic fluid is separated only by a connective-tissue and frequently very thin septum from the large lymph spaces of*

the spongoid area. Broad perivascular spaces connect the labyrinth with the porus acusticus and with the tympanic cavity.

An interesting question naturally presents itself: Why does the labyrinth-capsule at so late a period show this tendency to convert its compact, ivory-like bone into loose spongiosa? The process is all the more striking as similar changes have not been observed or suspected from the history in any other part of the skeleton. An explanation for this peculiar process is, according to our idea, to be found in the fact that the normal *labyrinth-capsule* remains throughout life unusually *rich in remnants of primary cartilage*. This occurs in the form of small and large deposits near the labyrinth spaces and is noticeable in sections by the deeper staining with eosin-hematoxylin. This staining does not affect the cartilaginous remnants alone, but the entire inner zone of the labyrinth-capsule and the outer zone, especially the area opposed to the periosteum, are stained bright red. The introglobular spaces surrounded by irregularly shaped walls are most frequent in the neighborhood of the posterior half of the oval windows and in the basal end of the upper, also of the lower cochlea wall—in other words, *in those regions which serve as places of predilection for the spongiouse formation*. (We have recently accidentally encountered an almost hemp-seed-sized piece of true hyaline uncalcified cartilage in the labyrinth-capsule of an old person. This was situated between the posterior edge of the oval window and cochlea, permeated with large oval cartilage cells. It lacked the peculiar superficial structure of the introglobular spaces, and took on a much deeper stain than the latter.) The semicircular canals, the margin of the round window, and the modiolus contain less cartilage and are consequently less prone to undergo the osseous change.

Similar to the cartilage remnants which are situated like discs between the epiphysis and diaphysis of the long bones and the parts of the skeleton derived from the procartilaginous third and partly second branchial clefts which commence to ossify in juvenile years, and like many cartilaginous

tendon insertions which later change to cancellous bone, we observe a process similar, though exceptional, occurring in the bony labyrinth, which terminates with the disappearance of the cartilage at the window margin and in the introglobular spaces. At the same time, the compact bone changes on to the type of connective-tissue bone with the formation of a fibrous medulla and periosteal deposits, the latter especially about the labyrinth window, in the stapes plate, in the oval window niche, and in the lower part of the cochlear spiral.

If I understand Koellicker (*Handbuch der Gewebelehre*, vol. i., p. 346) correctly, a similar process has been observed by him and by Strelzoff during the growth of the scapula and of the long bones in certain places and considered to be normal; except that there the resorptive process has predominated over the displacement of bone formed from cartilage by connective tissue. I do not from this fact wish to call the rarefaction of the labyrinth-capsule an osteitis, but rather to regard it as the final stage of a developmental process which normally does not occur in the petrous bone, though it is the rule in other bones, though not in the same form and at the same time.

In all the long and flat bones of the skeleton there is a continuous loss and regeneration after birth, so that the bone continues to grow without changing its external shape. In the labyrinth-capsule, however, there is an exception, as the size is attained at birth and a later decrease or increase, as far as the examination of the bone shows, takes place only in small limits. This probably is the reason that so many cartilage remnants are contained in the labyrinth-capsule to an old age, while in the other bones which grow, they generally disappear early.

It appears that a compact limitation of the labyrinth-capsule is important for the function of the organ therein contained, as this is pronounced in all higher developed animals. An active regenerative process as in the other bones would carry with it a disturbance in the position of the nutritive vessels and also of the cochlear canal; a more extensive blood supply from the side of the labyrinth and a closer connection

between the intralabyrinthine vessels with those of the bone capsule would be required. We know, however, that Hyrtle's views on the closed-in system of labyrinth vessels correspond practically to the actual state (see Siebenmann, *Die Blutgefäße im Labyrinth des menschlichen Ohres*, 1894) and that the blood-vessels of the endosteum communicate in only a few places through narrow capillaries with the blood current in the bone. The lymph circulating in the Haversian canals between the blood-vessels and bony wall is shut off from the general labyrinthine lymph space. The high importance from a functional standpoint of such a separation of the blood and lymph distribution is seen from the following condition found at autopsy in connection with the vessels of the hearing tests: bilaterally, except a delicate osteoid bridge at the left annular ligament, there are no changes in the middle ear, but there is an extensive rarefaction of the cochlea and semicircular canals and bone-conduction is very much reduced.

We were unfortunately unable to make a satisfactory functional examination in our case; hence the lower-tone limit could not be determined and the not very marked immobilization of the stapes was not diagnosticated in the living. We have no explanation for the decidedly reduced bone-conduction other than the changes just described of the labyrinth-capsule. This supposition gains force as there were no other anomalies in the labyrinth, and it is made almost certain by the fact that the hardness of hearing was found not on the side of the stapes-ankylosis but in that ear where the spongiosa formation had progressed farthest.¹

In both cases of Bezold where stapes-ankylosis was found at autopsy, the spongiosa also extended to the endosteum. The fact that bone-conduction was here not shortened but rather prolonged appears to contradict my explanation but is due to, first, the thickness and breadth of the spongiöse bridges in the annular ligament—*i. e.*, the bony stapes-ankylosis has reached such a marked degree in both cases,

¹ As abnormal rarefaction of bones is observed in the late forms of syphilitic disease, it would be well in future to examine more carefully the labyrinth-capsule at the autopsy of the syphilitic deaf. The well-known observations of Moos and Steinbrügge might be explained in this manner.

and, secondly, the rarefaction in one case has extended beyond the oval window and in the other not at all. Moreover, though bone-conduction was prolonged in both cases, it cannot be excluded that, at the time of the functional examination, the labyrinth function had already become affected. This is even more than probable when we compare the degree of prolonged bone-conduction in these cases with the prolongation observed in cases of stapes fixation produced artificially or by depression of the drum. In affections of the Eustachian tube¹ and in the indirect traumatic ruptures of the drum membrane² a prolongation of fifteen or nineteen seconds (measured with a Bezold-Katsch fork) on the affected ear, and ability to hear whisper in 20-60 *cm* were present, while in Bezold's cases of ankylosis similar changes in bone-conduction meant only hearing whisper in 6 *cm*. I have several examples, verified by Rinné's test, to show that in a pure middle-ear trouble (total closure) of young people the hearing distance for whisper may be one metre or more, in cases where Schwabach's test shows a prolongation of eighteen to twenty seconds. These two cases of Bezold's, therefore, support my view that rarefaction of the labyrinth capsule, if it extends to the endosteum, of itself affects the labyrinth function and causes a relative diminution of bone-conduction. I should just like to mention that I had reached a similar conclusion (*Z. f. O.*, xxii., p. 315) by clinical and experimental means, and proposed the statement that the labyrinth is always implicated in progressive bony stapes fixation, even in the supposedly pure cases—*i. e.*, even in complete presence of the characteristic functional symptom-complex.

It is not necessary here to discuss how, by the overlapping of the results of the functional examination of stapes-ankylosis and of the nervous progressive deafness, finally an atypical picture resembling the latter is produced, as v. Tröltsch has intimated. It suffices to say that a large proportion of such cases belong in this list which Bezold,

¹ Siebenmann, "Hörprüfungsresultate bei reinem Tubencatarrh," *Z. f. O.*, xxx., p. 308.

² Nother's "Traumatische Perforationen des Trommelfells," *Z. f. O.*, xxxiii., p. 19.

unable to classify among the middle-ear or labyrinth affections, placed in a special class under "Dysacusis." I should like to emphasize the importance of the determination of the lower-tone limit in general as a differential means of excluding the pure nervous deafness from the class of such combination pictures.

We have seen that rarefaction of the cochlea capsule, wherever it occurs, affects the function of the nervous terminal organ. In which way does such a disturbance occur and how can it be explained? The solution probably deals with *changes* in *pressure* and *density* which the labyrinth fluid suffers by influence of the spongioid spaces extending to the labyrinth fluid. Chemical changes surely take a part and assist in increasing the nutritive change in the delicate elements of Corti's organ. The extensive and in part very thin diffusion surfaces which in some spaces alone separate the enormous lymph spaces of the new-formed spongiosa from the perilymph of the labyrinth in the form of very thin membranes, increase greatly the number of existing lymph passages of the perilymphatic duct and of the perivascular spaces (however, only indirectly affected). While this was the chief communication to the interior of the skull or to the posterior cranial cavity, the labyrinth fluid now enters upon new relations to the peripheric lymph and vessels subjected to other pressure conditions. An alteration in the conditions of diffusion may not be the only change; as can be seen at several places in my specimens, the septum (reduced to a connective-tissue membrane) between the two lymph systems may also be absorbed; perforations with sudden changes in intralabyrinthine pressure and position may occur, and of such a kind that a reproduction of the former condition is not again possible. This is the only explanation for the loss of hearing and diminished bone-conduction, as the Corti's cells, stria vascularis, nerve, and labyrinth windows showed no marked changes microscopically. It can thus also be explained that just in this case vertigo with diminished hearing appeared in attacks, and that the hearing slowly or incompletely or never was brought back to the previous condition. Ménière's vertigo,

the morbus Ménière in the mild form and in the severe form with vomiting, nystagmus and excessive vertigo in apoplectic attacks, is not sufficiently explained¹; we think, however, that thereby a solution has been found, and are further convinced as we know that these patients usually present the other symptoms of so-called sclerosis. The peculiar subjective noises, as thunder, thumping, shooting, from which the patients suffer terribly, can be without difficulty referred to these perforations.

I will only casually state here that variations of density of the labyrinth fluid must be associated with alterations of sound-conduction. A diminution of labyrinthine pressure is possible in our cases; this would of itself as direct cause explain a diminished sound-conduction through the labyrinth fluid and the shortening of cranial bone-conduction. We must by all means consider all of these factors if we wish to explain the remarkable fact that spongiosa formation of the labyrinth capsule with stapes-ankylosis produces in one case a prolongation, in another a shortening, of bone-conduction. In a case since examined at autopsy, a period preceded the stage of shortened and finally absent bone-conduction where Bezold's trias of stapes-ankylosis was well developed.

The question whether we should in future retain the expression sclerosis of the ear is to be answered negatively. The juvenile form of this symptom-complex is not a condensing process, but, as far as the bone is concerned, just the opposite. Progressive nervous deafness of older age depends, as we have shown, in most of the cases on quite different changes; a fact important both for the diagnosis and treatment. In future we will classify such cases of early or late appearing progressive deafness with aid of the other factors, important for diagnosis, according to the result of functional examination in *nervous deafness* or *dysacusis* (Bezold) or *stapes-ankylosis* with the addition: rarefaction, "spongiosierung," of the labyrinth-capsule.

¹ The implication of the canal pro nervo utriculo-ampullaris in the process of spongiosa formation does not change the nerve or its connective-tissue sheath. The changes found in the bony circular canals, as the ampullæ are unaffected, can only in the above-described manner and way contribute to cause the attacks of vertigo.

In regard to the treatment, remembering the results of the autopsy it can be positively stated that local medication, treatment of nose and throat, injections of medicines into the tubes, massage of the drum, myringectomy, tenotomy, and stapedectomy, excision of oval window, etc., as well as the use of potassium iodide, thyroidin, and pilocarpin, are of no avail and may aggravate the condition by their irritating action. Hence such treatment must be abstained from where the diagnosis of rarefaction of the labyrinth capsule is made. The fact that catheterization not rarely produces an improvement of hearing in progressive nervous deafness, if only transient, can be explained because in spongiöse formation of the region of the cochlea tips the lumen of the bony tube is somewhat narrowed (only recognized, microscopically, by thickening of the periosteum). Of the internal means, phosphorus alone seems to me to promise anything. This, according to recent investigations (Mirwa and Stötzner, *Jahrbuch für Kinderheilkunde*, vol. xlvii.), in rational administration is able, at least in the long bones, to prevent the formation of the (normal) spongiosa and to favor the formation of compact bone. I usually prescribe an oily solution or Kassowitz's emulsion, 0.01 %, and give 10-20, later 30-40 *ccm* daily. If the stomach is very susceptible to fat, the phosphorus may be given in glutoid capsules, of which each 0.5) contains 1 % phosphorus oil and is dissolved in the intestines. According to the above authors, small and long-repeated doses are preferable, as the phosphorus acts only when every gastric disturbance is avoided. Our results with this treatment are too meagre and not positive enough to permit of any conclusions. They have, however, encouraged us to continue our experiments on a greater plan.

CONTRIBUTIONS TO THE KNOWLEDGE OF INTRACRANIAL COMPLICATIONS OF EAR DISEASE.

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Translated by Dr. RICHARD JORDAN, New York.

NOTWITHSTANDING the gratifying results which the surgical treatment of intracranial complications of ear diseases has obtained of late, we cannot but confess that our diagnostic ability and operative procedures are still in need and capable of further improvement. From this point of view it seems desirable to record all such cases in detail. At the same time such complete and continuous publications from the different aural clinics will give us a better insight into the relative frequency of cerebral abscess, sinus-thrombosis, meningitis, and their combinations.

The following report comprises all cases of intracranial otogenous suppuration treated in the Rostock Aural Hospital since Professor Koerner took charge of it, November, 1896. These publications will be continued from time to time.

All cases not previously reported will be given in full with the following two restrictions:

1. The incurable cases of diffuse leptomeningitis will be but briefly mentioned unless they show features of particular interest that warrant a full report.
2. Of the numerous cases of pachymeningitis externa we shall include only extradural abscess, *i. e.*, the formation of

¹ From the Ear and Throat Clinic of the University of Rostock.

pus and granulations between the bone and dura mater or sinus.

Wherever the bone disease merely reaches the dura or sinus, even where they are discolored and granulating, but without the formation of pus or causing symptoms of sinus-phlebitis or pyæmia, neither diagnostic nor therapeutic considerations would justify the report of such cases, as they furnish no particular symptoms and require no other treatment than the removal of the diseased bone.

We wish to emphasize this distinction as we find that quite a number of cases of simple pachymeningitis externa have been reported as extradural abscess — an error which might easily confuse our views on the frequency of extradural abscess.

Of the intracranial suppurations observed in the period referred to, the following have been previously reported :

1. *Phlebitis of sinus petrosus sup. and meningitis. Death.* (Koerner, *Die otit. Erkrankungen*, etc., 2d edit., p. 71.)
2. *Pyæmia after acute mastoiditis from measles. Death.* (Koerner, *THESE ARCHIVES*, vol. xxvi., p. 294.)
3. *Phlebitis of sinus transversus from cholesteatoma of petrous bone. Recovery.* (Preysing, *ibid.*, xxvii., p. 404.)
4. *Sinus-phlebitis from cholesteatoma. Operation. Meningit. serosa ventricularis ac. Death.* (*Ibid.*)
5. *Sinus-phlebitis with pulmonary metastases. Leptomeningitis. No operation. Death.*
6. *Phlebitis of sinus transversus. Sepsis. Operation. Death.*
7. *Sinus-phlebitis and pulsating perisinuous abscess from cholesteatoma.* (*Ibid.*)
8. *Phlebitis of sinus cavernosus in chronic mastoiditis. Recovery after mastoid operation.* (*Ibid.*)
9. *Extradural abscess in acute mastoiditis. Operation. Recovery.* (*Ibid.*)
10. *Acute extradural abscess. Operation. Recovery.* (*Ibid.*)

Of the cases of *leptomeningitis purulenta* which have not yet been published, the following will be briefly mentioned :

11. Fritz H., aged forty-one, comes to clinic January 31, 1896, with pain in both ears after influenza.

Treatment. Double paracentesis and evacuation of pus. Pat. is lost sight of until March 5, '96, when he appears again with double mastoiditis and cerebral symptoms.

Operation, which reveals an enormous destruction in both mastoid processes, does not stop the progress of the meningeal infection. Death, March 9, '96.

Post-mortem: Extensive suppurative infiltration in spongiosa around hiatus of can. Fallop. On account of this peculiar propagation in the spongy bone beneath the corticalis, this case together with a similar one (No. 19) will be reported in full in a separate publication.

12. Marie N., aged thirty-eight. Rec. Feb. 26, '98. Otorrhœa duplex since early childhood. Mastoid operation. Both mastoids represent mere shells filled with pus and granulations. Death March 26, '98, from meningitis.

Autopsy: Basilar meningitis, probably started from a small deep-seated extradural abscess in the posterior fossa.

13. Emma L., aged twelve. Otorrhœa for two years from diphtheria. Acute exacerbation. Family physician opened periosteal abscess on left mastoid. Chill. Sent to hospital Aug. 26, '98. Mastoid operation: Mastoid, antrum, and attic full of granulations, which are removed. Death on third day after operation with meningitis. Transition of inflammation into cranium through carious tegmen antri et tympani.

The following case of leptomeningitis deserves a more detailed report:

14. Shotgun injury of temporal bone followed two years later by middle-ear suppuration. Operation: removal of ball. Second operation ten months later for mastoiditis. Meningitis. Death.

Gustave D., aged thirteen. Shot himself accidentally in left cheek, Dec. 31, '94 (Flobert rifle, cal. 6 mm). Considerable hemorrhage from wound and ear canal. No other symptoms noticed. Wound healed promptly within two weeks. In the fall of '96 the left ear begins to discharge. No pain, but tinnitus and deafness. Pat. asks clinical advice April 15, '97. Muco-purulent discharge in left meatus. Ball visible in upper osseous wall imbedded in granulations, firmly adherent. Operation the same day: Ball chiselled out after temporary displacement of auricle. Tym-

panum found full of granulations enveloping the dislocated hammer; incus not found. May 9, '97, dismissed from hospital; still slight discharge and granulations in posterior part of tympanum.

Pat. paid irregular and infrequent visits to clinic until April, '98, when he returned complaining of great weakness, frequent chills, and dizziness.

Rec. April 29, '98. Status: Haggard appearance, slight vertigo. Profuse discharge from left ear. Canal stenosed through bulging of posterior wall. Swelling and fluctuation above and behind auricle. Temp. 37.5° —C.

Apr. 30th.—Mastoid operation. Subperiosteal abscess. Carious fistula leading to external canal. Large mastoid cells and antrum filled with pus and granulations. Incus found in antrum, small piece of metal in upper meatus wall near recessus epitympanicus. Wound left open. Plastic operation deferred.

May 1, '98.—Temp. in early morning 36.8° C., rises rapidly to 39.6° C. Lumbar pain. Wound of normal appearance.

May 2d.—Temp. mrg., 40.4° , P. 150; T. evg., 39.2° , P. 105. More backache. Restless.

May 3d–6th.—Temp. varying from 37.7 – 39.0° in the morning to 39.6 – 40° at night. Pulse about 100 p. min., regular. Condition stationary. No paralysis, no diplopia.

May 7th.—T. 38.0° , P. 100. Pain in neck, but no rigidity. Lumbar puncture in two places negative (no fluid obtained); diarrhœa. T. at night 40.1° C.

May 8th.—Temp. 37.4 – 40.1° C. P. 95–140.

May 9th.—Temp. 40.1 – 37.5° C. Fundus of eye normal.

May 10th, 4 A.M.—Temp. 37.4° . Pulse 140 and more, very small and feeble. Restlessness, slight rigidity of neck. Headache.

8 A.M. Temp. 39.4° , P. 120. At noon slight delirium. Sudden convulsions and spasm of respiratory muscles. Pulse 155 p. min., felt and counted two to three minutes after respiration stops. Artificial respiration without avail. Death.

Post-mortem: Extensive basilar meningitis, especially about chiasma. Dura on petrous bone appear intact and so do the facial and acoustic nerves. Removal of petrous bone not allowed. Way of suppuration from middle ear to cranium not found.

All other organs are healthy.

Remarks: With the ball fixed in the upper wall of the meatus outside the middle ear and the suppuration having

followed the injury after nearly two years, there did not seem to be any indication to lay bare all the cavities of the middle ear after the foreign body was removed. If the patient had not been lost sight of, the slight remaining discharge would probably have been cured or at least the ensuing mastoiditis been recognized and operated for in time. The meningitis showed the symptoms of septic infection and could not be safely diagnosed before the terminal respiratory convulsions.

Very gratifying are the surgical results in the following cases :

15. Cerebral abscess in right temporal lobe. Operation. Recovery.

Sophie S., aged twenty-three, servant ; since her first year the right ear has been discharging continually. On December 5, 1898, she took sick with severe frontal headache, vomiting, drowsiness, slow pulse ; discharge of ear increased and sanguinolent. Received December 14, 1898. Status : face very pale. Questions answered slowly and with hesitation. No real drowsiness. Pulse 60 p. min., small, regular. Temperature 37.1° C. Tongue coated, foetor ex ore. No earache but headache on right side near vertex.

Right tympanum full of granulations. Pus not offensive. No paralysis. No hemiopia. Pupils equally wide, reaction sluggish, beginning neuritis optica.

Operation (same day) : Middle ear full of granulations and cheesy purulent material ; hammer carious. Tegmen antri partially destroyed ; dura covered with granulations. Dura is laid bare in the whole granulating area ; it appears dull, discolored, is tense but shows pulsation. Incision of dura and exploration of temporal lobe with knife in three different directions to a depth of 3 *cm.* No pulse found. Brain substance pale, only slightly bulging into the opening. Cross-incision horizontally backward. Sinus exposed, appears healthy. Attempt to lay bare cerebellum is given up on account of severe hemorrhage from the injured emissary vein.

Wound packed with iodoform gauze.

December 15th-18th.—General condition fair. No more vomiting. Reaction to external impressions is sluggish. Temperature 37.0-37.6° C. Pulse 90-100.

December 19th.—Great apathy. No paresis, no rigidity of neck. Temperature 38.0° C. Pulse 70.

December 20th.—Last night very restless, moaning ; increased somnolence. Pupils wide, without reaction. Temperature 36.2° C. Pulse 64.

Second attempt to find the abscess, now supposed to be cerebellar because of the absence of crossed hemiplegia and in view of the failure of the previous exploration.

Cerebellum laid bare in sinus angle. Probing into cerebellar substance with scalpel in different directions with no result. Temporal lobe is again inspected and found pulsating. Several renewed probings are unsuccessful until at last an incision straight inward strikes the abscess at a depth of 4 cm. Incision of dura is enlarged and the finger introduced into the abscess, which is tortuous, the size of a hen's egg, and apparently without membrane. The purulent matter is offensive, thin, intermixed with numerous creamy flakes—quantity about two tablespoonfuls. Cavity drained with iodoform gauze. Immediately after the operation the pupils are narrow and responsive, the pulse is fuller and more frequent, 98 p. min.

December 21st.—Patient feels very buoyant, laughs, and asks for food. Pulse varying from 76–100, but strong. Temperature normal.

December 22d.—Dressing changed. About one teaspoonful of pus drains out after removal of gauze.

Eye-fundus : Disc hyperæmic on both sides ; the nasal edges are blurred.

December 23d.—Rubber drainage tube inserted.

December 25th.—All well.

December 26th.—At night slightly restless, in the morning drowsy. No objective symptoms.

Two drainage tubes put into abscess cavity, one into anterior, the other into posterior part.

December 27th.—At night much moaning, vomiting ; very restless. This morning : somnolence, slight rigidity of neck. No paralysis. Temperature 38.6° Pulse 100.

December 28th.—Still drowsy, but no more vomiting or rigidity of neck. Strength of left arm seems diminished.

December 29th.—Small prolapse of brain. Anterior drainage tube left out, posterior one shortened. In changing the latter some pus drains out.

December 30th.—Much better. Intellect clear. Weakness of left arm has disappeared.

Thereafter undisturbed recovery.

January 10, 1899.—Prolapse much smaller. After-treatment and daily dressing through ear canal.

February 22d.—Wound above and behind ear firmly cicatrized. Middle ear epidermized.

February 28th.—Dismissed as cured.

March 21st, April 6th, July 12th.—Patient and ear in excellent condition.

Remarks : The symptoms were those of increased intracranial pressure caused by a localized process. The rapidity of their appearance, the absence of a distinct choked disc, and the presence of a suspicious disease of the corresponding middle ear tended to exclude an intracranial tumor and pointed strongly to the diagnosis: cerebral abscess. As localized cerebral symptoms, especially crossed hemiplegia, were missing, and as the dura of the temporal lobe showed distinct pulsation, we were inclined to suspect the abscess in the cerebellum. Nevertheless it was found in the temporal lobe. Not without interest are the signs of cerebral irritation which occurred a week after the evacuation of the abscess, caused undoubtedly by the pressure of the drainage tubes. After the removal of the latter they disappeared promptly.

16. Enormous extradural abscess in posterior and middle cranial fossæ. Total destruction of transverse sinus and extensive destruction of dura; deep intradural abscess between second and third temporal convolutions. Operation. Recovery.

Anna L., aged thirty-six, had otorrhœa sin. since childhood, after measles. In the fall of 1895, acute exacerbation with profuse discharge.

October, 1898.—Influenza. November 10th: Severe earache, fœtid discharge, dizziness.

Rec., Nov. 26, 1898.—Ear-bandage soaked with very offensive pus. Continuous flow from ear canal of a thin, sanguinolent matter intermixed with gas bubbles. Mastoid tender on pressure. Gait staggering; intellect sluggish; no paresis. Pulse 76 p. min., small but regular. Temp. 36.8°. Eyes: pupils equally wide, react promptly, horizontal nystagmus; both discs swollen, edges blurred; veins enlarged and tortuous, hemorrhagic spots in both retinæ, more in the right.

Cranial operation: Corticalis sclerotic, $\frac{1}{2}$ cm thick. Large cavity beneath is lined with cholesteatomatous membranes and filled with discolored but not foetid granulations. While opening this cavity a large quantity of very offensive pus with gas bubbles rushes suddenly out from behind. Incision extended horizontally backward. Posterior part of squama temporalis and post.-inferior angle of os parietale removed. Lamina vitrea appears rough and is partly detached from diploë. The dura beneath is covered with granulations. Occipital lobe and upper cerebellum are separated by a deep horizontal furrow caused by the complete destruction of the outer sinus wall. Near the sinus-knee a necrotic piece of sinus is found, $1\frac{1}{2}$ cm long, and comprising nearly the whole circumference (its anatomical identity is confirmed by microscopical examination). Dura of temporal lobe is partially destroyed; the brain convolutions are clearly visible, pia mater is covered with granulations. Pus is oozing out from between the two lower temporal convolutions, and after separating them a small intradural abscess is found containing half a teaspoonful of pus. Radical operation of middle ear is postponed. Wound packed loosely with iodoform gauze. For two days after the operation considerable discharge of liquor cerebro-spinalis, which demands frequent renewal of outer dressing.

November 29th.—Patient in good condition; no headache, no vomiting. Pulse 96, regular; temp. 36.0°. Dressing changed on operating table. Whole scalp very œdematous except a small area around the right (healthy) ear.

Discharge of pus so copious that counter-incision is made near prominentia occip. From the grayish-white bone oozes discolored blood. The diploë is congested and discolored, tabula vitrea partly destroyed, partly detached from diploë. The boundary line of abscess and granulations is reached near the torcular. The removal of all the rotten bone results in an enormous defect in the skull, extending from the mastoid up to 1.5 cm from the torcular. It is 6 cm wide posteriorly and 4 cm wide farther in front. The abscess was bordered all around by an uninterrupted wall of granulations and the disintegration of the bone was confined to the same limits. Of the whole lateral sinus no trace could be found. After the operation a severe œdema of the right orbital region developed, which disappeared after forty-eight hours.

General condition excellent. Wound is dressed every second

day and heals rapidly. Neuritis optica subsiding ; January 14, 1899, fundus nearly normal.

January 16th, 1899.—Wound healed, except small fistula on mastoid leading into the cholesteatomatous cavity. Radical operation : Cholesteatoma, which lines the whole mastoid from the tip to the antrum, is thoroughly removed and the cavity curetted, enlarged, and polished in the typical way. Plastic : large flap is formed of membranous canal (Stacke) and tamponed against the roof of the cavity. From the external part of the membranous canal and the cyma conchæ a smaller flap is formed which is turned backward and sewed against the cut surface of the auricle.

February 20th.—Retroauricular opening and middle ear dry and epidermized.

February 23d.—Discharge from fistula near the torcular. Incision leads to a deep recess, in which a strip of gauze is found and removed.

February 28th.—Wound completely healed. To cover the opening in the skull a cap made of Stent's mass is fitted to it.

March 6th.—Patient dismissed as cured.

Last seen July 13th, in excellent condition.

Remarks : It could not be doubted that this case represented an intracranial suppuration, but whether we had to deal with a cerebral or a large extradural abscess was well-nigh impossible to decide. The operation unveiled a suppurative process — extensive and complicated beyond expectation. Besides the enormous destruction of sinus and dura the granulations on the pia mater and the abscess between the cerebral convolutions are of particular interest. Our knowledge of such intradural abscesses is confined to a small number of cases (Ceci, Barker, MacEwen).

As a rule, the inflammation spreads quickly through the meningeal meshes and the formation of a wall of granulations on the pia mater is of rare occurrence. Remarkable is the extensive destruction of the parietal bone apparently caused by the long-continued influence of the extradural abscess.

Noticeable for their absence were symptoms of local pressure, as hemiopia, crossed hemiplegia, and aphasia, which have been observed in similar cases.

The healing of the enormous wound took place in a comparatively short time, resulting, as was to be expected, in a large defect of the cranium; the latter was sufficiently protected by a simple prosthesis of Stent's mass.

17. Sinus-phlebitis in acute necrosis of mastoid and temporal squama after scarlet fever. Operation with ligation of jugular vein. Recovery.

Child, E. B., eight years old, developed scarlet fever three weeks ago. After two weeks, both ears became affected. The family physician made a Wilde's incision for left mastoiditis and sent the child to the clinic.

Received September 20, 1898; looks very ill. Eyelids and ankles oedematous; skin red, desquamating. Temperature 37.8°C . Urine contains albumen, epithelium cells, and leucocytes.

Both ear canals full of pus; behind left auricle, an incision of 1 cm in length discharging greenish pus, mastoid tender on pressure. Immediate mastoid operation. Corticalis discolored, pale. No fistula; cells full of offensive greenish pus. Granulations in antrum, which is curetted; mastoid tip removed.

Dura and sinus laid bare. The latter appears congested and thickened; there is a small discolored spot near its upper knee. Iodoform gauze. Temperature, before operation, 36.0° , rose two hours later to 41.8° , went down to 36.4° during the next twelve hours, and then rose again rapidly to 39.8° . The chart continued to show this intermittent type during the following days. There were no chills or profuse perspiration.

Second operation September 23d: Sinus laid bare more extensively; emissary vein is torn from it accidentally. Through the gap a solid thrombus is visible in the sinus; a few drops of pus ooze out. In the attempt to remove the outer sinus wall a severe hemorrhage occurs apparently from behind, which demands immediate tamponing. A series of enlarged glands alongside the sterno-cleido muscle are removed and the jugular vein exposed. It is empty and collapsed. At the lowest point it is cut between two ligatures. Wound of neck is sewed up.

On account of the continued intermittent fever, which rages from 35.9 – 41.2°C ., an attempt is made on September 27th to change the dressing; it causes a renewed hemorrhage from the sinus. Ligation wound on neck healed by first intention.

Intensity of fever subsides gradually, varying during the following two weeks from 37.0 – 38.0°C .

October 4th.—First change of dressing. Healthy granulations everywhere. Hereafter daily dressing in the usual way.

October 13th.—Patient complains about pain behind right ear, which had been discharging quite freely all the time. Mastoid is tender and slightly swollen. At the same time a swelling appeared above the left ear, extending over the whole mastoid muscle. No fluctuation. Temperature, 39.8. ° C.

October 14th.—Operation. Left ear: Incision through the infiltrated parts. A necrotic piece of bone is found above the linea temporalis, covered with sluggish granulations. After its removal, the dura is exposed and appears normal. No pulsation can be felt. Curettement. Iodoform gauze. On the right side a Schwartz operation is performed. The whole mastoid from the tip to the antrum and the dura is found very pliable, its cells partly destroyed and filled with granulations. Dura looks very red and congested. After-treatment in the usual way; healing progresses favorably.

December 7th.—Both mastoid wounds closed.

February 1st.—A small superficial abscess on the left mastoid requires incision and curetting.

March 29th.—Child dismissed from the hospital in the best of health.

Remarks: Remarkable is the very early development of sinus-phlebitis in acute mastoiditis. The necrosis of the temporal squama is not infrequently seen in infants, but its occurrence in older children is rather rare. The glandular swelling on the neck alongside the jugular vein was a symptom of the primary disease (scarlatina) and not caused by sinus-phlebitis; for the exposed jugular vein showed no symptoms whatever of inflammation. More difficult would it be to explain the continuance of the fever after the ligation of jugular vein. It could hardly be that infective matter from the sinus was carried into the system. Perhaps the nephritis was responsible for it. The glandular swelling also and the mastoiditis of the other side have to be taken into consideration.

18. Sinus-phlebitis in acute mastoiditis. Operation. Recovery.

Mr. K., aged twenty-eight, received March 24, 1898.

March 16, 1898.—Pain in left ear, discharge three days later; pain behind the ear followed, extending over the whole side of

head, especially at night. He alleges to have been unconscious once and to have had several chills. Status: Left meatus filled with muco-purulent matter, which pulsates out of a perforation in anterior-inferior quadrant of Mt. Upper-posterior part of membrane bulging, is incised. Soft parts over mastoid are infiltrated and very tender on pressure, particularly toward foram. mast. Temp. 39.0° C. Pulse 80 p. min.

March 25, '98. Operation: Corticalis discolored, congested. After the first stroke of the chisel, pus pulsates out. Bone beneath corticalis friable. Large cells are filled with granulations; but little pus. Antrum large, full of pus and granulations which are curetted. The bone disease extends to the knee of the sinus. Here pus wells out from between the bone and the sinus; sinus wall is partly destroyed, showing a disintegrated thrombus inside. The latter as far as it appears decayed is scraped out in both directions. Sinus wound and antrum are packed separately. Temp. after operation 37.1° , rises to 39.0° in afternoon.

March 26th.—Temp. 37.7 – 38.3° . No headache. Uninterrupted recovery.

April 4th.—Wound and membrana tympani healed up.

Remarks.—Here again the rapid development of a sinus-thrombosis in an acute mastoiditis is of notable interest.

19. Extradural (perisinuous) abscess in acute mastoiditis after typhoid fever. Operation. Recovery.

On account of the singularity of the primary bone disease, this case, together with the somewhat similar one No. 2, will be reported elsewhere.

It does not seem proper to add general remarks to this series of only nineteen cases, but it might be well to point out the comparative frequency of severe intracranial complications in acute and recent suppurations of the middle ear and petrous bone, and it might further be stated that of the nineteen cases all but three had intracranial complications before they came under our treatment. Two of these, Nos. 11 and 14, had been in our care previous to the intracranial infection, but had stayed away from the clinic until after the development of cerebral symptoms.

Only in one case (No. 12) it is possible, but not certainly proved, that the turn for the worse took place under our

treatment shortly after the operation for the primary disease of the temporal bone.

Of the nineteen cases, three were received with so severe pyæmia or sepsis that the operation seemed almost hopeless. One of them (No. 5) died before anything could be done, and two died immediately after the operation performed as a last resort to save them. Five cases succumbed to an inoperable diffuse leptomeningitis purulenta; one (No. 4) died from meningitis serosa ventricularis after an operation for sinus-phlebitis.

In the remaining ten cases, the intracranial suppuration was cured. These recoveries comprise one cerebral abscess (temporal), one intra- and extradural abscess with destruction of the transverse sinus, four phlebo-thromboses of the sinus transversus, and one phlebitis of the sinus cavernosus. The latter case got well after an operation for the primary mastoiditis without an intracranial operation.

The writer is indebted to Prof. Körner for inviting him to prepare the above paper as well as for assisting him in doing so.

EXAMINATION OF THE PUPILS OF THE MUNI-
CIPAL DEAF-MUTE SCHOOL AT
DANZIG, GERMANY.

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THE results of my examinations on the occasion of the introduction of aural teaching in our municipal deaf-mute school are hereby made public in the hope that this contribution, although it is but small, may promote the cause of deaf-mute teaching. So far, but few examinations of the ears of deaf-mutes by means of the continuous tone-series have been reported. Bezold-Edelmann's continuous tone-series enables us to convey to the ear every tone that it is capable of perceiving, and to define the limit of the capacity of any ear. My opportunities for literary research in this provincial town being limited, I chose Bezold's masterly examinations of deaf-mutes for my guide, and desire that my efforts in this regard be considered supplemental to his. I extended my investigations by using both Bezold's continuous tone-series and Urbantschitsch's harmonica for the purpose of comparing the two scales with each other.

In our school, which furnishes the material for my examinations, there were, during the winter term of 1898-99, thirty pupils—sixteen being boys and fourteen girls. All these pupils were examined, but the following schedule comprises the results of the examination of twenty-nine pupils or fifty-eight ears only, because in the case of one girl the hearing was but slightly impaired, as the result of chronic bilateral supuration of the middle ear.

In the following tables the pupils are designated in the

order in which they were examined, by the numbers 1 to 29, and the ears by r (right) and l (left).

The investigation was commenced by taking down the history of each case, and the hereditary and consanguineous conditions as stated by one of the relatives, in most cases by the mother. Next followed otoscopic examinations of the adjacent organs, tubes, cavities of the nose, and pharynx. The otoscopic examinations preceded the functional tests for the purpose of ascertaining the presence of obstructions to sound-conduction—cerumen, foreign bodies, etc.—and removing them. Next followed the functional examination with the continuous tone-series and Urbantschitsch's harmonica, which I had perfected by extending the scale in both directions, so that it comprises the full notes from C_1 to f^8 . I proceeded with more than ordinary precaution, which I considered advisable in the case of deaf-mutes to avoid errors. After instructing the pupil to raise his hand every time that he feels a sensation of hearing when the tone-producing instrument is brought near his ear, he was placed before the examiner with his face turned away and his eyes covered with a broad bandage, so as to prevent him effectually from seeing what is going on. The hair was brushed back from the ear which was to be examined, and any hair that would not stay back was cut off, so as to avoid any possible contact with the tone-producing instrument. The other ear was closed tightly with the end of the finger of an assistant, which finger had first been dipped into liquid paraffin. Care was also taken not to bring the instrument to the ear rapidly and suddenly, so as to avoid any movement of air which might be mistaken for sensation of hearing. Deaf-mutes are anxious to hear and always ready to believe that they do hear. Their sense of touch is very acute, as is evidenced by the following incident. One of the boys raised his hand regularly every time that the tuning-fork was brought near his ear, whether it was vibrating or not. The bandage over his eyes was carefully examined and properly adjusted, the hair was brushed back of the ear, the tuning-fork was brought near his ear slowly and carefully to avoid any motion of the air, and in spite of all, the

boy would raise his hand when the tuning-fork was not vibrating. The mystery was solved at last when I warmed the tuning-fork in my hand. The cold metal had caused a sensation in the boy's ear, which he mistook for hearing.

The examination proceeded in this careful way, generally beginning with the right ear, and using the deepest tone of tuning-fork 6 of the continuous tone-series dis, and thence ascending and descending in the scale. Every tone in the continuous tone-series that was heard was marked red in the schedule, the same as Bezold indicated it in his examinations of deaf-mutes, whereas every perceived tone of the harmonica was marked blue. Those sections of the range of hearing which were perceived only when the tuning-forks were struck hard, or when the pipes were blown hard, were designated by broken lines. Thus each organ of hearing received its own schedule, which Bezold justly considers an advantage.

After completing the examination by means of the two scales, I tested the acuteness of hearing in each octave with c and g of the unweighted tuning-forks of the continuous tone-series. The result of this test was put down in two decimals for each tone.

Following the example of Bezold, I finally tested each ear with a bell, the tone of which lay between d⁴ and dis⁴, and recorded the results at the end of the schedule.

The examination was concluded with a test of the ability to hear the speaking voice, which was made during special meetings to avoid fatiguing the pupils. In these tests I was assisted by the principal of the institution, Herr Ravan.

The foregoing description shows that my examinations required a good deal of time, averaging from two to two and a half hours for each pupil. All the pupils were submitted to a second test, and to my gratification I found that the results agreed with those of the original examination.

Among the twenty-nine deaf-mutes who were examined, there were, according to the statements of their relatives :

11 congenitally deaf, viz.: Nos. 9, 12, 16, 19, 20, 23, 24, 25,
26, 28, 29—or 37.9 %

15 had acquired deafness, viz.: Nos. 1, 3, 4, 5, 6, 7, 8, 10, 13, 14, 15, 17, 18, 22, 27—or 51.7 %.

3 were doubtful cases, viz.: Nos. 2, 11, 21—or 10.4 %.

The causes of deafness were :

In 4 cases, Nos. 7, 13, 18, 22, or 26.7 %, cerebro-spinal meningitis.

In 3 cases, Nos. 6, 8, 10, or 20 %, inflammation of the brain.

In 3 cases, Nos. 1, 14, 15, or 20 %, convulsions.

In 2 cases, Nos. 3, 17, or 13.3 %, scarlatina.

In 1 case, No. 27, or 6.7 %, chicken-pox.

In 1 case, No. 4, or 6.7 %, eruption of the scalp.

In 1 case, No. 5, or 6.7 %, unknown.

The figures for acquired deafness, 6.7 % from unknown causes, agree with those of other investigators ; thus Wilhelmi found 6.3 %, Schmaltz 7.1 %, Barth 6.6 %, Bezold 5.8 %; Falk only, with 27.8 %, shows different results.

In three cases, Nos. 2, 11, 21, or 10.4 %, the reports of the relatives were incomplete, and it had to be left undecided whether deafness was congenital or acquired. In this regard also the statements of different investigators do not agree: Wilhelmi found .8 %, Falk 2.8 %, Hartman 3.9 %, Lemke 6.9 %, Bezold 7.6 %, Frankenberger 12.5 %, Schmaltz 13.2 %, Roller 15.1 %, and Mygind 21.5 %. My figure, 10.4 %, differs by 1 % only from the average of the foregoing percentages, which is 9.4 %.

Adenoid growths were found during my examination as follows :

2,	Nos. 26, 27,	in children,	7	years of age		
2,	"	20, 25,	"	8	"	"
2,	"	6, 15,	"	9	"	"
1,	No.	17,	"	10	"	"
1,	"	14,	"	11	"	"
1,	"	9,	"	14	"	"
1,	"	1,	"	15	"	"
1,	"	28,	"	16	"	"

Depression of the drum-head was found in eighteen ears, bilateral in each case, therefore in nine children or 31 %. The depression of the drum-head occurring on both sides

proves that the cause was the same on both sides, viz., adenoid growths.

Ten ears, or 17.2 %, showed traces of former deafness on the drum-heads—namely, scars in 3 ears, or 5.2 %—Nos. 15 r, 21 r, 26 l; opacity of the drum-head in 7 ears, or 12 %—3 r, 3 l, 4 r, 4 l, 12 r, 12 l, 24 r.

In two ears, or 3.4 %, chronic suppuration of the middle ear was found, case 24 l showing perforation of the drum-head, and case 15 l polypus with perforation.

The examination of the nasal passages revealed suppuration in seven instances, or 12 %—bilateral in 9, 22, 28; unilateral in 4 l.

The tests with the continuous tone-series showed 10 cases of total deafness, being 17.2 %, and 48 cases of partial deafness, or 82.8 %.

These results are more favorable than those of Bezold, who found 30.4 % of total and 68.4 % of partial deafness.

The cases of partial hearing are divided into five groups only. Bezold gives six groups. Group III. of his scale—defective regarding the upper part of the scale—is omitted, no cases of that kind having been found in my examinations.

Group I. Small areas to the extent of $2\frac{1}{2}$ octaves			
shows	3 ears, or	5.2 %	
Group II. Intermissions	13	"	22.4 %
Group IV. Defects at the upper and lower ends			
of the scale.....	12	"	20.7 %
Group V. Defects at the lower end of the scale			
extending over 4 octaves.....	2	"	3.4 %
Group VI. Defects at the lower end of the scale,			
under 4 octaves.....	18	"	31.1 %
	<hr/>		
	48 ears, or	82.8 %	

Taking them individually,

Bilateral deafness was found in 3 pupils, or 10.3 %

Unilateral deafness in . . . 4 " 13.8 %

Partial hearing in both ears in 22 " " 75.9 %

" in one ear . . . 4 " " 13.8 %

Bilateral total deafness was found in 3 cases only—7, 11, 20—or 10.3 %; partial hearing in one or both ears in 26 cases,

or 89.7 %. These figures approximate those of Bezold, who found

15 totally deaf, or 19 %

63 with partial hearing, or 79.7 %

Special interest attaches to the question of the relation between the degree of partial hearing in the different groups and the different forms of deafmutism.

In table I. the degrees of partial hearing are arranged according to the forms of deafmutism.

TABLE I.

Group.	Number of Ears.	CONGENITAL DEAFNESS.		ACQUIRED DEAFNESS.		DOUBTFUL.	
		Number.	%	Number.	%	Number.	%
Total Deafness...	10	3	30	5	50	2	20
I.....	3	1	33.3	2	66.7	—	—
II.....	13	6	46.2	7	53.8	—	—
IV.....	12	5	41.8	7	58.2	—	—
V.....	2	—	—	1	50	1	50
VI.....	18	7	38.9	8	44.4	3	16.7

It is to be seen from this table that total deafness is to be found more frequently among those who acquired deafmutism than among those who were born with it. That the reverse is the case in regard to partial hearing is not at once apparent, yet comparing the totals we find for congenital deafmutism 145 octaves for 22 ears, against 116½ octaves for 30 ears in cases of adventitious deafness, or an average of 6.6 octaves for each ear of the congenitally deaf and 3.9 for those whose deafness has been acquired. From this it seems probable that the doubtful cases are mostly congenital deaf-mutes.

The presence of analogous defects in both ears furnishes interesting points regarding the extent of disease-processes.

In 10 totally deaf ears I found..... 6 bilateral, or 60 %
 In Group I. I found among 3 ears..... 0 " —
 " II. " " 13 " 6 " 46.2 %
 " IV. " " 12 " 6 " 50 %
 " V. " " 2 " 0 " —
 " VI. " " 18 " 12 " 66.7 %

Compare these figures with those of Bezold, who found:

Among 48 totally deaf ears	30	bilateral, or 62.5 %
In Group I. among 28 totally deaf ears . . .	10	" " 35.7 %
" II. " 20 " " . . .	8	" " 40 %
" III. " 1 " " . . .	—	" " —
" IV. " 8 " " . . .	4	" " 50 %
" V. " 18 " " . . .	6	" " 33.3 %
" VI. " 33 " " . . .	22	" " 66.7 %

The fact that my figures are almost the same as Bezold's shows the correctness of his conclusion that "the percentage of bilateral analogous defects of hearing has an important bearing on their nosological identity."

The results of the tests with the harmonica are not arranged in groups but are divided similar to Bezold's.

Among 10 ears which appeared totally deaf during the tests with the continuous tone-series, there were 6 (20 r, 13 l, 7 r, 20 l, 7 l, 10 r), or 60%, which showed small remnants of hearing, ranging from $\frac{1}{2}$ to 3 octaves, during the tests with the harmonica. All remnants of hearing are within the small and great octaves. Four ears, or 40%, are totally deaf to both the continuous tone-series and the harmonica.

Comparing the tests with the two instruments respectively, we find that among the 58 ears there were 10 ears, or 17.2 %, totally deaf to the tones of the continuous series, but only 4, or 6.9 %, to those of the harmonica. The last named figure, viz., 6.9 %, does not differ materially from that found by Urbantschitsch, who states that only 3 out of 144 ears, or 2.1 %, were totally deaf to the tones of the harmonica.

Of the 3 ears of Group I., one—10 l—showed a defect at the upper end of the scale of the harmonica. One—8 l—at the upper and lower ends; and one—28 r—a blank. The number in this group is too small to justify conclusions.

In Group II. there are among 13 ears:

- 1 ear—17 r—which perceived all the tones of the harmonica.
- 4 ears—19 r, 23 r, 15 r, 19 l—or 30.7 %, with defect at the upper end of the scale of the harmonica.
- 6 ears—16 r, 1 l, 22 r, 4 l, 16 l, 25 r—or 46.2 %, with defects at the upper and lower ends of the scale.

2 ears—17 l, 13 r—or 15.4 %, with intermissions in the scale.

This group shows the largest number of ears with defects in both the upper and lower parts of the scale of the harmonica.

In Group IV. there are among 12 ears :

1 ear—29 l—which perceived all the tones of the harmonica.

3 ears—22 l, 3 r, 23 l—or 25 %, with defects of less than two octaves at the lower end of the scale.

4 ears—12 l, 9 l, 9 r, 4 r—with defects of $3\frac{1}{2}$ octaves at the upper end.

3 ears—8 r, 6 r, 3 l—or 25 %, with defects at the upper and lower ends.

1 ear—6 l—with intermissions.

This group contains the largest number of cases—33.3 %—with a defect in the upper portion of the scale of the harmonica.

Of the 2 ears of Group V., 1 ear—18 l—perceived all the tones of the harmonica and 1—2 l—showed a slight defect in the lower end of the scale of the harmonica.

Of 18 ears in Group VI. :

15 ears, or 83.3 %, perceived all the tones of the harmonica.

2 ears, or 11.2 %, with defects in the upper portion of the scale of the harmonica.

1 ear, or 5.6 %, with a slight defect in the lower portion of the scale.

A comparison of the two scales shows some interesting details:

I. Of the 10 ears which are totally deaf to the continuous tone-series, 6 show small areas for the harmonica in the smaller and greater octaves, which proves that the tones of the greater and smaller octaves of the harmonica have the largest amplitude.

II. In all the ears of Group I. the upper limit is higher in the continuous tone-series than in the harmonica. This shows that the tones of the upper portion of the scale of the continuous tone-series have a greater amplitude than those of the harmonica.

III. In most cases the lower limit of the range of hearing

lies deeper in the harmonica than in the continuous tone-series. This shows that the tones of the lower portion of the scale of the harmonica have greater amplitude than those of the continuous tone-series.

After the tests with the tone-series, the duration of hearing of each ear was ascertained for the tones of *c* and *g* in each octave. The figures which I obtained differ from those given by Bezold. I found the following :

G vibrates 258 seconds. According to Bezold, 203 seconds.

c	"	194	"	"	"	169	"
g	"	209	"	—	—	—	—
c ₁	"	273	"	—	—	—	—
g ₁	"	206	"	"	"	270	"
c ₂	"	145	"	"	"	223	"
g ₂	"	127	"	"	"	212	"
c ₃	"	115	"	"	"	142	"
g ₃	"	132	"	"	"	91	"
c ₄	"	49	"	—	—	—	—
g ₄	"	24	"	"	"	17	"
c ₅	"	8	"	—	—	—	—

It was found that the duration of hearing decreases as the range of hearing approaches the upper end of the scale. This corroborates the supposition that in most cases deaf-mutism is caused by lesions in the organ of Corti.

Next followed tests with a bell, the specific tone of which lay between *d*⁴ and *dis*⁴. The distances at which the bell was heard are given in metres. The room in which the examination was held did not admit of distances over 8 metres, therefore I use the mark $> 8\ m$ for those who could hear at a greater distance.

The ten totally deaf ears and the three ears of Group I. did not hear the bell.

Of the 13 ears of Group II., 8 ears, or 61.5 %, did not hear the bell; in 5 cases, or 38.5 %, the distance varied between .05 *m* and .5 *m*.

Of the 12 ears of Group IV., 1 ear, or 8.3 %, did not hear the bell. With the remaining 11 ears which heard the bell, the distance varied between .01 *m* and 1.2 *m*.

In Group V., the distance ranged from .4 *m* to 3.25 *m*.

Of the 18 ears of Group VI., 9 ears, or 50 %, heard the bell at a distance of > 8 *m*, and with the remaining 9 the distance varied between .15 *m* and 7.75 *m*.

Comparing the distances in the different groups at which the largest number of cases heard the bell, we find that in :

- Group I. none heard the bell ;
 " II. 8 did not hear the bell ;
 " IV. 6 from .05 *m* and .2 *m* ;
 " V. " .4 *m* and 3.25 *m* ;
 " VI. 9 > 8 *m*.

From this it is to be seen that with the increasing limit of audition, the distance also increases, which proves that Bezold's arrangement of the cases into six groups is proper.

I have now reached the last of my tests, namely, that of ascertaining the ability of deaf-mutes to hear speech. It is advisable to make separate tests of the ability to hear consonants, vowels, and words.

Of the 10 totally deaf ears, 4 ears, or 40 %, perceived the sound of *p* correctly, but none of the other consonants was heard.

In Group I., with three cases, *p* was perceived by 2 ears, or 66.7 %.

In Group II., with 13 ears :

p was perceived by 7 ears, or 58.3 %,
r " " " 3 " 25 %.

In Group IV., with 12 ears :

p was perceived by 8 ears, or 72.7 %,
r " " " 4 " 36.4 %.

In Group V., with 2 ears :

p was perceived by 1 ear, or 50 %,
t " " " 1 " 50 %,
r " " " 2 ears, or 100 %.

In Group VI., with 18 ears :

p was perceived by 15 ears, or 83.3 %,
t " " " 14 " 77.8 %,
r " " " 11 " 61.1 %.

¹ It should be borne in mind that the author refers to the rolling *r* in German.—The Translator.

These large percentages do not prove actual auditory perception of the sounds of *p*, *r*, and *t*, as correctly remarked by Bezold, but simply that these sounds cause tactile sensations which may be easily mistaken for hearing, as any one will notice if he sounds these consonants while holding the back of his hand before his mouth.

Similar results were found regarding the consonant *f*. This was perceived by, totally deaf ear, by 1 in Group II., and by 2 in Group VI.

m, *n*, and *l* were perceived by very few ears only, which, as Bezold explains, is accounted for by the fact that the special tone of these nasal consonants lies within the limit of the lower scale of tones that are not perceived by most deaf-mutes.

n was heard by 1 ear in Group II., which could distinguish all the tones of the scale with a slight intermission from *cis*² to *fis*².

In Group VI., *m* was heard in 3 instances, *n* in 2, and *l* in 1.

The consonant *k* was heard in 2 instances in Group VI.

The consonant *s* and the other sibilant sounds were also heard in Group VI. only, namely, in 4 instances.

In testing the ability to hear vowels, the degrees of pitch were used which Helmholtz has fixed for this class of sounds, viz.:

for <i>u</i> tone <i>f</i> ,
“ <i>o</i> “ <i>b</i> ,
“ <i>a</i> “ <i>b</i> ² ,
“ <i>i</i> “ <i>d</i> ⁴ .

The totally deaf ears and those of Group I. did not hear any of the vowels.

In Group II. *u* was heard by 1 ear, being the only one in this group which could perceive the whole lower part of the scale; *a* and *o* were heard by 1 ear which had shown only a slight defect in the lower part of the scale.

In Group IV.:

<i>u</i> was heard by 2 ears,
<i>a</i> “ “ 4 “
<i>i</i> “ “ 1 ear.

In Group V.:

u	was heard in	1 ear,
o	" "	1 "
a	" "	2 ears,
i	" "	1 ear.

In Group VI.:

u	was heard in	17 ears,
o	" "	15 "
a	" "	17 "
i	" "	17 "

The results of the vowel tests with deaf-mutes showed that when a vowel was perceived the tone corresponding to that vowel was also perceived, which proves the correctness of Helmholtz's arrangement of the vowels.

The results of the tests of the ability to hear words were as follows:

Numbers were not perceived by the totally deaf nor by those of Groups I. and IV.—according to Bezold's statement only the numbers 1-10 and 100 were tried. In Group II., 8 and 100 were heard by 15 r. In Group V., 18 l heard all the numbers except 4.

In Group VI.:

5 r	heard all numbers.
5 l	" " except 2.
18 r	" 3, 9, 10, 100.
15 l	" 2, 3, 4, 6, 8, 9, 100.

Now, what are the practical conclusions that may be drawn from the foregoing? The tests which have been made in the public schools by Richard, Weil, Bezold, Schmiegelow, and Ohleman have demonstrated that in a considerable number of school children the ears were in a sufficiently diseased state to require the treatment of an aurist. There is, therefore, urgent need of the services of inspecting physicians who are skilled in the examination of the eye and the ear. In the case of deaf-mute children this need is still greater, because the ears of all of them are defective and in many of them the disease which caused deaf-mutism is still active. I found adenoid growths in eleven

deaf-mute children. Such growths hinder correct articulation. Every pupil who articulates badly should therefore have his nose and throat examined.

Chronic suppuration of the nose and of the middle ear claims special attention—all that needs to be mentioned in this connection is that in some instances tubercle bacilli were found in the discharge from the ear. I therefore agree with Bezold that it should be one of the first rules of school hygiene to place children who are suffering from chronic suppuration of the ear under treatment by an aurist. Fortunately the constant warnings of this kind have not remained unheeded, and better attention is now paid to the physical conditions of the pupils of the public schools and of deaf-mute institutions.

Of greater importance is the question which was brought out by the experiments of Urbantschitsch and Bezold, namely, in what way the partial hearing of deaf-mutes can be utilized. It is a well-known fact that a considerable number of deaf-mutes possess sufficient hearing to receive instruction through the ear, and attempts of this sort have been made since Itard and Toynbee. The results of Urbantschitsch in conjunction with the teachers of the deaf-mute school in Döbling, Austria, have excited universal interest, and Urbantschitsch is entitled to great credit. He practised his aural exercises with all pupils, even those who are totally deaf, and insists that hearing can be developed even in apparently totally deaf persons. It remains to be seen how far he is correct. I do not believe that the results will be of much practical value, because all that can be expected is that the deaf-mutes will learn how to make use of the partial hearing that they possess. It may be safely asserted that if portions of Corti's organ have been destroyed by disease, they cannot be restored through aural exercises.

The results of Urbantschitsch's agitation was that the teachers of deaf-mutes introduced his method in their schools before it could be examined by the aurists. No proper selection of suitable pupils for aural exercises having been made, complaints of failure were soon heard on all sides,

and some of the teachers became opposed to aural instruction. Urbantschitsch by his experiments has therefore done very little to advance the cause of deaf-mute teaching.

The interest in this question was increased when Bezold published the results of his examination of deaf-mutes, showing that he had succeeded in defining the limit of hearing of each ear. Thus a guide was furnished for the instruction through the ear. The results obtained at the Central Deaf-Mute Institution in Munich prove that Bezold's method is correct. This method was approved by the State Department of Public Instruction, which decreed that "the semi-deaf and semi-mute receive special instruction with a view of preserving and improving their ability to hear and to speak." Since the instruction through the ear was introduced in the deaf-mute institutions of Bavaria, similar steps have been taken in the schools of other States of the German Empire, and it is to be hoped that, in spite of the opposition from many quarters, aural teaching will soon be carried on in addition to articulation teaching in all the German schools. I repeat again that aural teaching is to form an integral part only of the general system of deaf-mute education without superseding the instruction in and by articulation. Only the semi-deaf and semi-mute are to be taught aurally in separate hours. I hope that the Joint Convention of Aurists and Deaf-Mute Teachers, which is to meet next September at Munich, will solve this question satisfactorily, and that the time will soon come when aurists and deaf-mute teachers will work unitedly for the advancement of the deaf and dumb.

REPORT ON THE TRANSACTIONS OF THE TWENTY-
THIRD ANNUAL MEETING OF THE AMERICAN
OTOLOGICAL SOCIETY, HELD AT WASHINGTON,
D. C., APRIL 13, 1900.¹

Dr. HERMAN KNAPP, New York, after demonstration of some anatomical specimens, related a case of **extensive acute caries of the mastoid and petrous portions of the temporal bone, on which he operated successfully with restoration of perfect hearing and preservation of the external ear canal and the tympanic cavity.**

He sums up the noteworthy features of the case as follows :

1. In an acute tympano-mastoid suppuration of a healthy man, thirty years of age, who never had had ear trouble before, the tympanum, drum-head, and hearing power were restored, while the destruction went on in the mastoid, and the adjacent third of the petrous portion of the temporal bone, under formation of an outer fistula of the mastoid.

2. Headache and the continuance of the mastoid disease determined the patient to give his consent to an operation which he had formerly refused.

3. The operation, consisting in a total resection of the mastoid, exposing the dura in the posterior cranial fossa, scooping away all the carious bone in the basal portion of the petrous, and carving out with a sharp spoon the bony wall of the facial canal in its whole length through the mastoid, and the entire horizontal semicircular canal, forming a platform from the latter to the frontal semicircular canal, where the caries stopped.

4. The complete and unusually rapid recovery, with integrity

¹ This being the conjoined triennial Congress of the American Physicians and Surgeons, one forenoon only was allotted for the meeting of the Otological Society. The abstracts contained in this report have been kindly furnished by the speakers, for which the editors of these ARCHIVES, in the name of the readers, express their thanks.

of the sound-conducting apparatus, and restoration of perfect hearing. [Operation January 15, 1900; discharged from hospital February 1st; wound closed February 16th; March 1st, H $\frac{1}{4}$ ", V $\frac{3}{8}$.]

Discussion.—Dr. DENCH spoke commendingly on the management of Dr. Knapp's case. It showed what excellent results could be obtained if, during the progress of an operation, we modified the general plan in its details according to the conditions we encountered on our way. Clear exposure and competent appreciation of these conditions were the secret of success.

Dr. GRUENING : I would say that in this connection we should not forget that this work has been done by Jansen, of Berlin, who has published a large number of cases of caries of the petrous portion of the temporal bone, and has successfully operated on a large number, so that he certainly opened our eyes to this matter many years ago, and those who know the literature of otology are aware that these operations have been performed by Jansen. I have also performed it in a number of cases knowing that Jansen had precedence in the matter. It is a law of surgery to remove carious bone wherever we meet it. I must say, though, that I have refrained from removing it from around the facial canal. Dr. Knapp, in his case, says he cleaned out everything around the facial canal. After he had found caries in the canal, I think he could probably have opened the bone freely and allowed the extrusion of the carious substance. In these cases we often see that the facial nerve preserves its function. I saw a similar case in Berlin in the clinic of Jansen, where he removed everything, but avoided carefully just that portion of the bone which included the facial nerve. To produce facial paralysis in an operation is a very grave thing, especially in cases of the young, and in female patients.

Dr. RANDALL said there was one point in Dr. Knapp's paper he would like to emphasize, the preservation of hearing. In the serious danger to life which these cases generally entail, the question whether the hearing is saved or not was regarded as of little importance, but the *aurist* who sacrifices the hearing is like the obstetrician who saves only the father. The early as well as the radical intervention in these cases was at times extremely important if we wanted to retain the function of hearing. In the severer cases, the penetration of the carious process to the dura and not infrequently to the petrous portion was the rule rather than the

exception. In at least half of his last one hundred cases he had to lay bare the dura.

As to the facial, he said that with good light and careful cleansing of the field with gauze strips, the facial canal could be well defined and as a rule scraped clean, and even caries removed, without injury to the nerve.

Dr. C. H. BURNETT said that thoroughness in cleaning away all that is diseased was the chief object in operation for chronic ear disease, and Dr. Knapp, having done that in the case he reported, could have obtained healing by first intention if he had desired it. He illustrated his remarks by a case where he obtained healing by first intention after a mastoid operation, but a relapse followed later, as the tympanic cavity had not been thoroughly cleaned out. When this was done by a radical operation, permanent recovery ensued.

Dr. BACON said that he could not second all Dr. Randall mentioned. He had had one or two cases of permanent facial paralysis. He avoided the facial canal wherever possible. In all the cases he had operated on there was considerable hemorrhage and great difficulty in seeing what could be removed with absolute safety.

Dr. KNAPP, replying to Dr. Gruning's remarks, said he was aware that nothing new had been done in the operation he had reported. It was an advanced case of aural disease, but singularly fortunate. The carious destruction of the whole mastoid had extended deeply into the petrous portion, disintegrating the cancellous part of the bone, but not yet affecting the compact osseous structure of the walls of the facial and semicircular canals. The walls of the facial passed, like an untouched ivory rod, from above downward, and as there was no symptom of disease in the facial nerve, no indication presented itself to interfere with the canal. The disintegration stopped at the superior vertical canal, leaving the vestibule and cochlea intact, which accounted for the rapid recovery and the excellent auditory result of the case. Dr. K. said that he also, in his visits to Berlin, had frequently availed himself of the generously given opportunity to witness the superior skill of Dr. Jansen, who in dealing with the extensions of mastoid disease to the petrous portion and through it into the posterior cranial fossa, stood at the head of the pioneers in this field.

Dr. C. H. BURNETT maintains that **chronic ear vertigo** of Ménière's syndrome is chronologically the latest symptom of chronic catarrhal otitis media, being always preceded by profound deaf-

ness and tinnitus. It is due to undue impaction of the stapes in the oval window, as well as to stiffening of the round-window membrane, from the catarrhal condition of the drum cavity. In a normal ear any inward pressure of the stapes upon the labyrinth fluid is compensated by a corresponding outward movement of the membrane of the round window toward the tympanic cavity. Any undue pressure from within the labyrinth by influx of perilymph or endolymph from the cranial cavity is compensated by a corresponding outward movement of the stapes as well as of the round-window membrane towards the drum cavity. All or any of these compensations being interfered with, intralabyrinth pressure is increased, the ampullar nerves are unduly compressed, and reflex phenomena evoked which are termed ear vertigo. As these altered conditions of intralabyrinth pressure are not constant, but vary with the health of the patient and the state of the drum cavity and internal ear, chronic ear vertigo is paroxysmal in nature. As retraction of the chain of ossicles and consequent impaction of the stapes in the oval window, in chronic catarrh of the middle ear, play the greatest part in the production of these vertiginous phenomena by a compromise of the internal ear cavity, Burnett proposes to liberate the stapes from the superposed incus by removal of the latter, through an incision in the upper posterior quadrant of the membrana tympani of the etherized patient. This he has done in 27 cases, giving entire relief from vertigo in every instance.

Dr. RANDALL spoke of the **clinical anatomy of the Eustachian tube**, and the rediscoveries of the Eustachian catheterization as showing need of better appreciation of the known anatomy. Among all the variables of aural topography the position of the tube-mouths may be counted a constant since it is essentially related to bony structures of little varying configuration; and the claims of variation are generally with reference to unrelated nasal and pharyngeal points instead of to the back edge of the hard palate, which is the true landmark. The lumen of the tube is a slit, usually collapsed and at its inner third devoid of the "safety-tube"; while a valve-like fold in its bifurcated lower part serves with the drag of the relaxed palate to insure its closure except in the act of swallowing. Slight variations are to be expected in all points of aural anatomy, but those of the tube having real clinical importance will be very rarely found. Sections, casts, and bone-preparations were used in illustration of the points insisted on.

Dr. HIRAM WOODS, Jr., Baltimore, Md., read the **clinical history of a fatal case of septic sinus thrombosis.** Patient, a boy thirteen years old. Family history of tuberculosis. Measles when he was two years old, followed by right otorrhœa, which has persisted with occasional intervals ever since. Apparently he never has had careful treatment. About the 2d October, '99, after a paroxysm of right earache, had a chill, followed by fever. This was repeated each day till Oct. 5th, when the family physician was summoned, who sent patient to the reporter. On admission the boy was in great pain. T. 101.6°, P. 106. There was diffuse mastoid tenderness, the aural canal was filled with a polyp, while the general appearance of the boy was septic. He had a pyæmic rigor shortly after admission. Save for these constitutional symptoms there were no indications of sinus involvement. Locally the case presented the picture of internal mastoiditis only. Operation was performed next day. Mastoid process was eliminated. The polypus above mentioned sprang from a small area of necrosed bone. The inner wall of the mastoid covering the sinus was soft. Bone was removed, exposing the sinus for a space of an inch and a half. Dura was necrotic, while the external sinus wall was ulcerated, the lumen being plugged above and below by a yellowish, fibrinous clot. This was removed with curette, and good blood currents obtained in each direction. Sinus was closed with plain gauze. On the two succeeding evenings there was an elevation of temp. but no chill. Then, without characteristic change in the thermal line, there developed in the course of ten days a painful swelling in the neck, along the inner border of the sterno-mastoid muscle. A large amount of pus was evacuated from the jugular canal, the vein being found collapsed. After this the T. line became pyæmic. Metastatic abscesses developed in different parts of the body. Death occurred on Nov. 11th. General streptococcus infection was found on autopsy, together with a septic thrombus, closing the clavicular end of the jugular. The paper discussed the general question of ligation of the jugular in cases of septic thrombosis where on operation good blood currents are obtained and there are no symptoms of jugular involvement.

Dr. E. B. DENCH, New York, reported a **case of sinus thrombosis, complicated with cerebellar abscess.**

Discussion.—Dr. GRUENING: I recall at present several cases of thrombosis of the lateral sinus in some of which the thrombus

was removed and in some it was not removed ; in some the jugular vein was ligated and in others not.

The FIRST CASE is that of a soldier returning from Porto Rico, who had typhoid fever, and who, in the course of the fever, developed a thrombosis of the large veins of the leg. He was recovering from his typhoid fever when he was taken with mastoid disease. He had a temperature of 106° and I decided to operate. I found a large mastoid of the pneumatic variety and all the cells were filled with serous fluid, an examination showing that it abounded in streptococci. The lateral sinus was laid bare ; the inner table was still sound, but on it were a large number of these small cells filled with serum. I found that the sinus was absolutely solid. This patient was very weak and I did not think it advisable to proceed any farther. I assumed that it was possible for such a man to have a non-infective clot in his sinus, just as in the veins of the leg. I found to my joy the next morning an almost normal temperature, and he made a rapid recovery with the sinus blocked with this thrombus ; so then there are cases, no doubt, in which the thrombus is non-infective and can be dealt with as in other parts of the body. That is one class of cases.

A SECOND CASE was that of a child who came into the hospital with a history of long-standing otorrhœa. It had had several chills a few days before admission. I found a thrombus of the lateral sinus, not only of the sigmoid portion, but also of the lateral sinus proper, and this extended very far back. It was necessary to expose two and a half inches of the sinus. It was cleaned out completely. The bacteriologist found that the thrombus was non-infective and I concluded that it was not necessary to ligate the jugular vein. The child recovered. So there is a second class of cases where we do actually remove even the non-infected thrombus.

Then a THIRD CASE, that of a young woman, nineteen years old, who came to the hospital with a history of chronic otorrhœa. She had had a great deal of headache, and for the past week before admission several chills. On examination we found caries of the ossicles, caries of the walls of the tympanic cavity ; there was no tenderness ; the bone was thick and I assumed that perforation had occurred into the sinus and that there was probably an abscess. On opening I found a perisinuous abscess. After cleansing it thoroughly I put a needle into the sinus and drew blood, which was found to be non-infective. The patient did not, however, improve. She had still chills and high temperature characteristic

of sinus thrombosis and I then made a large incision into the sinus. There was a free flow of blood from above and below. Nevertheless, I ligated the jugular vein, assuming that there was, perhaps, an incomplete thrombus at the bulb. The patient recovered. So that there is a third class of cases where, though we do not find a clot in the sinus and no evidence of clot on aspiration, still if the temperature continues as the characteristic temperature of infective thrombosis we should still ligate the jugular.

A FOURTH CASE is that of a young woman who came to the hospital four weeks ago with ordinary mastoid disease. I did a complete operation and she did well for the first two weeks, at the end of which time she had very high fever, $104-5^{\circ}$. I put her under ether, examined the sinus, and found it was perfectly healthy. As there was no indication for any operative interference I concluded to wait, assuming that there was pyæmia without thrombosis. This patient then developed a swelling in her knee, had a fluctuating temperature, then she had an inflammation of all the extensor tendons in one hand, and then an inflammation along the tendons in the foot. She died, and I thought that if I had in this case ligated the jugular the result might have been better. So that there is a class of cases where we cannot find the thrombus and yet have all the symptoms of infective thrombosis where it is well to ligate the jugular.

There is no hard-and-fast rule. To say that in every case of this kind we should ligate is not correct, and to say that in no case should we ligate is not correct.

DR. EDWARD FRIEDENBERG, New York, read a paper on **pneumococcic perisinuitis**.

Discussion.—Dr. GRUENING: In fifty cases of mastoiditis we have had only three cases of pneumococcus infection, and these three cases did well. In the other cases were found streptococcus and staphylococcus. The bacillus of grippe was not found.

Dr. GORHAM BACON, New York, reported a case of **chronic purulent otitis media, followed by an abscess in the temporo-sphenoidal lobe, and also an abscess in the cerebellum; autopsy**.

The patient, Mrs. A. P.—, thirty-two years of age, had suffered at times from a chronic discharge from the right ear, although of late years it had given her no trouble, except that the hearing was defective. For one month prior to her admission to the infirmary she complained of severe pain in this ear, and radiating

pains on the same side of the head. Three days before admission the discharge from the ear reappeared.

For two weeks she has been confined to her bed, and nine days ago she had two chills on the same day. Following the chill there was vomiting, and since that time she has had some nausea and vomiting.

As the pain in her head and ear was severe, her family physician prescribed opiates, and when she came to the hospital, February 13, 1900, she was under the influence of morphine and very stupid. Temperature 100 $\frac{1}{4}$ ° F. Pulse 80. Respiration 20. Right external auditory canal full of pus, and very little left of the drum-head.

Under ether, that same day, the usual mastoid operation was performed, and pus,—offensive in character,—granulations, and softened bone were removed. No opening could be detected in the tympanic roof, and as it was difficult to make a diagnosis of intracranial complication owing to the administration of the morphine, any further operative interference was postponed.

February 18th.—The pain has continued. To-day she has paralysis of left abducens, paralysis of left side of face, slight left hemiparesis, moderate left hemianæsthesia, left homonymous hemianopsia, and choked discs.

Diagnosis.—Abscess in right temporo-sphenoidal lobe.

Second operation.—Original wound reopened and the incision carried upwards so that the bone could be thoroughly cut away for a considerable area above the ext. meatus. Dura found thickened, but not adherent to the tympanic roof. A small sinus found in the dura with a probe. This was enlarged, and a large abscess found on the right temporo-sphenoidal lobe. About two ounces of pus evacuated.

For several days after the operation the patient seemed to improve, but later the paralysis became worse, the choked discs more marked. Patient very restless, and a diagnosis of probable leptomeningitis was made. The patient lived till March 3d.

Autopsy.—The temporo-sphenoidal lobe presented a large abscess cavity passing well back. It had been well drained. The base of brain presented nothing of special interest. Abscess found in right lobe of cerebellum. Foul-smelling pus and very thick. It appeared to have begun in the dentate body, which it destroyed. It then passed across to the opposite lobe, which it invaded to the extent of half an inch. The ventricles were found normal. No communication could be demonstrated between these two abscess cavities.

REPORT ON THE PROGRESS IN OTOTOLOGY AND
RHINOLOGY DURING THE FOURTH QUAR-
TER OF THE YEAR 1899.

BY DR. A. HARTMANN.

Translated by Dr. ARNOLD KNAPP.

ANATOMY OF THE EAR.

272. VARAGLIA, S. On the elastic fibres of the drum membrane. *Arch. ital. di Otologia*, vol. ix., p. 49.

272. Elastic fibres are abundant in both the tense and the flaccid portions of the drum, and can be grouped in three kinds :
1. Elastic radial fibres of various thickness ; these run in the radiating layers. 2. Elastic circular fibres are most numerous in the periphery and run in the circular layers. 3. Very fine reticular fibres which connect the two varieties. GRADENIGO.

PHYSIOLOGY OF THE EAR.

273. SCHÄFER, K. The determination of the lower limit of hearing. From the psychological seminary of Berlin University. *Zeitschr. f. Psychologie*, etc., 1899, p. 161.

273. According to SCHÄFER, previous experiments on the absence of overtones in the production of the lowest tones are not convincing. He considers the proof lacking that tones of 16 or perhaps of even lower number of vibrations are audible, though the possibility is not denied. He shows by experiments that even 16 stimulations in a second are capable of producing a tone perception. The lower limit is not exactly determinable, not a sharply defined point, and may show variations with the attention, the kind of sound sources, and the condition of other circumstances.

HARTMANN.

GENERAL.

a.—REPORTS AND GENERAL COMMUNICATIONS.

274. VILLARET. The increase of ear disease in the German army. *Deutsche militärärztliche Zeitschrift*, 1899.

275. LAUFFS. On the results of aural treatment in deaf-mutes. *Medic. Correspondenzbl. d. Würt. ärzt. Landesvereins*, Nos. 40-43, 1899.

276. VÖLCKER. Arrested development of the speech centre. *Brit. Med. Journal*, Dec. 26, 1899.

274. In the twenty-three years from 1873-96, the number of aural affections in the German army which came under treatment has steadily increased, and has risen from 6.28 ‰ to 12.12 ‰. The increase was gradual and equal in all battalions. In addition to this increase, a decrease in mortality after ear disease was also noted. The number of discharges as unsuitable or invalidated on account of ear disease has considerably increased. The author is unable to give a cause for this increase, and refutes, according to the reviewer, without convincing proofs, the natural conclusion that the increase of ear disease is only apparent and due to the better otological knowledge during the last decade.

KÖRNER.

275. The patients were 59 deaf-mutes and one hearing-mute, and varied from 7-22 years in age. Examination revealed naso-pharyngeal adenoids to be the most frequent anomaly (61 ‰); also atrophic rhinitis and retractions of drum-membrane were frequent, and chronic aural suppuration, and simple opacity and perforation of the drum-membrane were rarer conditions. In 48.2 ‰ of the congenitally deaf and in 23.6 ‰ of those becoming deaf later, hearing of vowel sounds was preserved; 35 ‰ of the congenitally deaf and 81 ‰ of the others were totally deaf for speech.

In 80 of the 120, various operations were undertaken; removal of cerumen, adenectomy, tonsillotomy, etc. After the course of a few months, the excellent result was obtained that 49 were not improved but 37 were more or less improved, and it was found that in the congenitally deaf a disease of the sound-conducting apparatus or of the naso-pharynx was present in greater proportion than in those who became deaf, and further treatment in the former variety gives much the better hope of improvement.

In two cases, hearing necessary for ordinary life was obtained by removal of adenoid vegetations. The latter operation in four

other cases was followed by marked improvement. The author closes with the plea that children during their first year in a deaf-mute institute should be tested for their hearing and an appropriate treatment of the ears, nose, and throat be instituted.

MÜLLER.

276. At a meeting of the Clinical Society of London held on December 8th, VÖLCKER showed a girl aged seven and one half years, who was unable to speak. She was the elder of two children, her brother being healthy. The father's sister had a child, aged eleven years, who was said to be similarly affected, the family history being otherwise good. The child had been quite healthy until the age of six months, when she had a series of general convulsions. These fits recurred occasionally up to the age of three years, when they disappeared. She walked at twelve months, but had never spoken. She was quite rational and intelligent. The hearing was normal. Spontaneous speech was limited to a few monosyllabic sentences. She could not recognize printed or written words, numerals, or letters, but recognized pictures of objects or objects themselves. She was unable to write letters, words, or numerals, or to copy them. She could, however, copy straight lines or circles with either hand, preferably with the left. When writing with the left hand, she frequently made marks from right to left. Accepting the existence of a visual and an auditory perceptive centre and a glosso-kinæsthetic and cheiro-kinæsthetic centre as maintained by Bastian, Völcker thought that it appeared as if the two former centres were intact, but that the latter, or their commissural connections with the first two centres, were involved. He thought that the convulsions had in some way damaged the region referred to, and produced arrested development. The prognosis was thought to be favorable and the treatment recommended was instruction in writing and in lip language.

ARTHUR H. CHEATLE.

b.—GENERAL SYMPTOMATOLOGY AND PATHOLOGY.

277. TODD, FRANK C. Conveyance of infection through the medium of the ear syringe. A remedy. *Four. of the Amer. Med. Assoc.*, Oct. 14, 1899.

278. OPPENHEIMER, SEYMOUR. The effect of atmospheric changes on the hearing in chronic catarrhal otitis media. *N. Y. Med. Jour.*, Oct. 21, 1899.

279. MASIP, J. A. Otitis media in atrophic rhinitis. *Revista de Ciencias Médicas*, Oct. 19, 1899.

277. An ear syringe to be aseptic and practicable must meet the following requirements: 1. The point which comes in contact with the ear must be capable of sterilization and so constructed that it can be easily removed. 2. There must be no suction through the point.

The fountain syringe answers these requirements. Small glass points are used and changed after using in a septic case. The objection that the current of the fountain syringe cannot be regulated at will is overcome by a bulb attachment, which has a valve at each end. The solution is drawn in at one end and through a tube so large that the bulb is quickly filled. The rubber tube at the other end is smaller and terminates in a joint fitted with a shield to protect the operator from the return flow. The point can be unscrewed and sterilized. J. B. CLEMENS.

278. The observations and conclusions drawn are from a study of fifty (50) consecutive cases of chronic sclerosis of the middle ear, extending over a considerable period of time. The usual tests were used to determine the variations in the hearing under different atmospheric conditions.

Conclusions: I. The hearing in at least seventy per cent. (70%) of the cases with chronic catarrhal deafness becomes worse under adverse weather conditions.

II. The degree of impairment of audition, as influenced by atmospheric conditions, is determined, to a great extent, by the location and the character of the pathological process in the tympanic cavity.

III. The morbid alterations most susceptible to barometric variations are those of hyperplasia.

IV. In purely atrophic changes in the middle ear, weather variations have little or no effect upon the auditory function.

V. Atmospheric influences also impair the hearing by unfavorably affecting catarrhal processes of the upper respiratory tract and Eustachian tube.

VI. All things being equal, the impaired audition in chronic catarrhal otitis is diminished more (under unfavorable conditions) in those whose general health is below par than in those otherwise healthy. J. B. CLEMENS.

279. MASIP arrives at the following conclusions from a study of nineteen reported cases:

1. Sclerosing otitis media developed in patients with atrophic rhinitis with considerable frequency—in one sixth of the

cases, presumably in direct connection with the nasal affection. The middle-ear inflammation forms a well-characterized group in the heterogeneous group of middle-ear scleroses.

2. These otitides are peculiar on account of the age at which they appear in children and young individuals; they occur about the same time in both ears with slight intensity without the paracousis of Willis (?), without labyrinthine symptoms or hyperæmia of the malleus or Shrapnell's membrane.

3. Some of the scleroses do not appear until at a later age; they are, however, to be regarded as the continuation of previous otitides.

4. Patients with atrophic rhinitis may be affected by other kinds of otitis and with greater frequency, independent of the nasal atrophy, as with acute or chronic catarrhal or even purulent otitis.

HARTMANN.

C.—METHODS OF EXAMINATION AND TREATMENT.

280. MATTHAEI. Athletic respiration, a hygienic therapeutic aid in diseases of the nose, throat, and ears. *Therap. Monatshefte*, 1899.

281. STURROCK, CHARLES A. A method for the removal of foreign bodies from the nose and ear. *Brit. Med. Jour.*, Nov. 25, 1899.

280. MATTHAEI means by athletic respiration deep respiration with closed mouth for an hour to the full limit, with subsequent holding of breath for about fifteen seconds. Chronically inflamed mucous membranes, especially of the Eustachian tube, are thereby diminished.

KILLIAN.

281. STURROCK applies suction by means of a piece of india-rubber tubing, rather less in diameter than an ordinary lead-pencil, and varying in length from one to three inches, according to the distance of the foreign body from the surface, attached to the nozzle of a brass syringe. He finds it advantageous to dip the tubing into glycerine, thereby diminishing the chance of air entering between the tube and the foreign body.

ARTHUR H. CHEATLE.

EXTERNAL EAR.

282. LERMOYEZ. A case of menstruation from the right ear. *Ann. des mal. de l'or., du lar.*, 8, 1899.

283. SCHIMANOWSKI. Paralysis of the abducent nerve following acute diffuse inflammation of the external meatus. *Westnik oftalmologii*, Jan., 1899.

282. A girl, fourteen years old, otherwise healthy, and who had never menstruated, suffered from hemorrhage from the right ear in monthly periods, after preceding feeling of malaise, which continued for several days. After three years, normal menstruation set in, though frequently accompanied by bleeding from the right ear and epistaxis. The ear canal was hyperæsthetic and presented some dilated vessels. ZIMMERMANN.

283. A few weeks after the aural affection, the paralysis set in and slowly disappeared with the healing of the ear canal.

SACHER.

MIDDLE EAR.

a.—ACUTE OTITIS MEDIA.

284. VOGT. Facial paralysis during acute otitis media. Heidelberg, *Inaug. Dissertation*.

285. LEWIS, ROBT. A brief history of five cases of mastoiditis. *N. Y. Med. Rec.*, Oct. 28, 1899.

286. TANSLEY, J. O. Shall we use cold in acute middle-ear or mastoid affections; if so, how long? *Laryngoscope*, Nov., 1899.

284. A complete exposition of the anatomical relations of facial nerve canal and description of the causation and clinical symptoms of facial paralysis, based on twenty-three cases collected from the literature and two observed at the Heidelberg clinic.

BRÜHL.

285. The writer's object in reporting these cases is to demonstrate the rapid and insidious development of serious complications in acute middle-ear inflammation, and to illustrate that the mastoid operation is, *per se*, unattended with danger.

CASE 1.—A boy, aged nine, had otitis media acuta following scarlet fever and nasal diphtheria. The inflammation first attacked the right ear. Notwithstanding paracentesis of a bulging drum-membrane by Dr. Albert Buck, and douches of bichloride solution 1:6000, mastoiditis was well developed two days after. Operation showed the mastoid to be much involved, the cells filled with a quantity of pus. A few days after the mastoid operation the lymphatic glands in the neck of the same side supplicated; they were opened freely and much necrotic tissue

removed. Still later the left ear became inflamed. Mastoiditis followed, for which operation was performed. The patient's condition was poor, but it improved after each operation. Three days after the left mastoid was opened pericarditis and endocarditis, with mitral regurgitation and aortic obstruction, were discovered. The ears healed, but the patient died later of the cardiac involvement.

CASE 2.—The patient, a male, while apparently convalescent for two weeks from an attack of tonsillitis, suddenly developed otitis media acuta. Without any known cause, he was found, two days after, in a state of marked and alarming collapse. Membrana tympani red and bulging, especially in the posterior superior quadrant, in which was a small perforation, allowing the escape of pus. No tenderness, œdema, or redness over mastoid. Temperature, 103.2° F.; pulse, compressible, intermittent, 120. Patient's condition critical. The mastoid cells were opened; bony walls were eroded and the large cavity filled with pus. Sigmoid sinus was exposed and found covered with granulations. A fistulous opening through the tympanic roof was found, though the overlying dura was healthy. Shortly after the mastoid operation, a phlebitis of the left leg and perihepatitis developed, prolonging the convalescence. The aural lesion finally healed.

286. TANSLEY, in reviewing the question and reporting a case in detail, reaches the conclusion that the use of cold in mastoiditis is more harmful than beneficial. Its application quiets pain and keeps down external swelling, thus masking the condition prevailing beneath, in the substance of the mastoid. Thus, as cold applied according to the prevailing methods is insufficient to destroy the microbes, its use should be discontinued. Early operation is urged, particularly if the middle-ear trouble is, or has been, an attical one.

CLEMENS.

b.—CHRONIC OTITIS PURULENTA.

287. CIMA, F. Acid bacillus (smegma-bacillus) in the exudate of sucklings' otitis. *Archiv. ital. di Otol.*, vol. ix., p. 72.

288. PAUTET. Cholesteatoma of the ear. *Gazette hebdom. de médic. et de chirurg.*, No. 99, 1899.

289. VON ZUR MÜHLEN. A case of necrosis of the labyrinth. *St. Petersburg. med. Wochenschr.*, No. 13, 1899.

290. HESSLER. Middle-ear suppuration and cerebral tumor. *Arch. f. Ohrenhl.*, vol. xlviii., p. 36.

291. BARATOUX. The indication for the exposure of the middle-ear cavities in the chronic suppurations. *Le progrès médical*, Nov. 18, 1899.

292. LUCAE. Profuse escape of cerebro-spinal fluid for five weeks without cerebral symptoms. *Berl. klin. Wochenschr.*, No. 40, 1899.

293. LOMBARD. Essay on the indications of the opening of the mastoid process and of the middle-ear cavities in chronic purulent otitis. Paris, G. Steinheil, 1899.

294. TRAUTMANN. The persistent retro-auricular opening after the radical operation and the plastic closure of the same. *Arch. f. Ohrenhkl.*, vol. xlviii., p. 1.

295. HAMMERSCHLAG. The operative exposure of the middle-ear cavities in chronic otorrhœa at the University clinic of Professor Politzer. *Wien. klin. Wochenschr.*, No. 43, 1899.

296. KÜSTER. Osteoplastic exposure of the mastoid process. *Centralblatt f. Chir.*, No. 43, 1899.

297. PASSOW. Küster's osteoplastic operation on the mastoid. *Münch. med. Wochenschr.*, No. 49, 1899.

298. PANSE. On Professor Küster's osteoplastic operation on the mastoid. *Centralblatt f. Chir.*, No. 50, 1899.

299. KÜSTER. The criticism of Dr. Panse. *Ibid.*, No. 52, 1899.

287. Based on eight observations, CIMA reports that occasionally a bacillus resistant to acids can be found in the discharge of chronic purulent otitis, which resembles the tubercle bacillus but is classed among the smegma-bacilli. The tubercle bacillus is not so frequently found as is sometimes stated. A certain method to decolorize after treatment with carbol fuchsin is the use of acidulated alcohol for ten minutes. GRADENIGO.

288. PAUTET describes the clinical and pathological pictures of cholesteatoma of the ear. He supports the Bezold-Habermann theory of the origin of cholesteatoma and agrees with Siebenmann's views. SCHWARDT.

289. A poorly nourished child of two and a half years has had bilateral otorrhœa for one year after scarlet fever. The right canal is filled with polypi. Facial paralysis. Radical operation. The mastoid process was normal externally; the antrum, middle ear, and aditus filled with granulations; no ossicles found, all diseased parts removed. A regular after-treatment was not possible.

Four months later there was a fistula behind the ear, gangrene of the skin over two square centimetres, very foetid discharge, exuberant granulations on the promontory, with area of white bony surface rough to the touch. After detachment of the auricle a large piece of bone and an entire circular canal were removed with the sharp spoon. This fragment of bone contained all the bones of the cochlea and the vestibule and the int. auditory meatus. Healing by aid of skin grafts. HARTMANN.

290. HESSLER reports eighteen cases of brain tumor occurring with chronic otorrhœa and adjoins a personally observed case. A girl, aged eleven, after scarlet fever, left acute otitis media, right deafness with no change in drum. The trouble in the left ear was complicated by a mastoiditis which necessitated operation. This was followed by occasional fever, vomiting, apathy. Considerable albuminuria. On the eighteenth day two transient convulsive seizures of the left, then of the right side, with unconsciousness, fever. Trephining, the dura appeared tense and was incised, negative puncture of the brain. Some improvement until the thirteenth day, severe pains were felt in the left ear, followed by coma, continuing to death. The trephine opening was again exposed; after release of necrotic brain matter two spoonfuls of clear cerebro-spinal fluid were discharged from a fistula which led to a cavity as large as an apple. Death four days later. At autopsy a sarcoma of the size of a child's kidney was found in the left temporal lobe.

Uræmia, brain abscess, or serous meningitis has previously been suspected. The presence of the tumor explains the right-sided, total deafness; this and the distended left lateral ventricle had completely flattened the left upper temporal convolutions.

In the complete discussion on the diagnostic difficulties of these rare cases, Hessler says that brain tumor must always be suspected and even hysteria. "The more certain the diagnosis, the surer are generally the results of operative treatment."

BLOCH.

291. BARATOUX considers the indications for complete exposure of the middle-ear spaces under the following headings:

1. In case of complicated otorrhœa.
2. To cure chronic purulent otitis media.

Under 1, it is necessary to make the complete exposure in presence of beginning meningeal symptoms. The dura is exposed and the wound thoroughly cleansed. The cerebral signs then

often disappear. If this is not the case after twenty-four hours, sinus thrombosis or brain abscess is present, and appropriate operative measures must then be undertaken.

The broad exposure of the ear spaces and the dura is indicated also when the brain symptoms appear in the picture of so-called "meningisme," *i. e.*, chronic irritative meningeal symptoms without any violent outbreaks.

Baratoux mentions MacEwen's observation that in acute exacerbations of a chronic otorrhœa, pneumonic attacks may occur which also call for the radical exposure.

The radical operation is indicated in well-marked subjective symptoms, fistula, facial paralysis, protrusion of the upper part of the ear canal, fungous granulations springing from the dura, and in local tuberculosis. Ossiculectomy and exposure of the attic are indicated in cholesteatoma, granulations, polypi, and perforations which have resisted non-operative treatment. In case of a relapse, the radical operation is then indicated.

SCHWENDT.

292. The seventeen-year-old patient was operated on by LUCÆ because of an otorrhœa continuing after opening of the mastoid process. After opening the mastoid process a large bony defect of the size of a five-cent piece was found at the upper and posterior part, where the dura lay bare, and covered by a sequestrum measuring a square centimetre. On removing the sequestrum an opening was found in the dura and arachnoid which immediately discharged so large a quantity of cerebro-spinal fluid with blood as to bring the operation to an end. This discharge continued for five weeks, and during the first fourteen days necessitated a twice daily change of dressing. During all this period no cerebral symptoms whatever appeared. Lucæ thinks this excessive production of cerebro-spinal fluid was caused by the irritation exerted by the sequestrum.

MÜLLER.

293. A very thorough monograph (113 pp.) on this subject, with thirteen personal observations.

HARTMANN.

294. TRAUTMANN repeatedly advocates the permanent retro-auricular opening. Thereby is avoided the deformity in the auricle caused by Siebenmann's plastic. The horizontal incision of the canal divides the flaps for the posterior surface into a narrow upper and a broad lower one, the vertical incision being made at, and not in, the concha. The lower flap is sutured to the inferior angle of the wound, while the upper is tamponed. To

hasten retarded epidermization, occurring, according to Trautmann, in long-standing otorrhœa, swollen and hyperæmic mucous membrane, chronic naso-pharyngitis, syphilis, tuberculosis, skin grafts are employed. To retard hypertrophy of the epidermis in healed cavities, a white precipitate salve, one per cent., is used, and dry sterile gauze is introduced. Membranes are sometimes formed in the situation of a regenerated drum; these, however, do not spring from remnants of the drum.

The retro-auricular wound diminishes with time. A year should pass before an attempt be made to close them, never in cholesteatoma. The closure of the epidermized fistula is done after Passow's method with some modifications. The auricle is then so placed that the scar is invisible. In the twenty-three cases reported, primary union always took place. The hearing was sometimes improved, sometimes made worse; the former appeared to be the case when the epidermis covering was thin. BLOCH.

295. In addition to the usually accepted indications for exposing the middle-ear spaces, POLITZER gives the following: 1. In obstinate suppurations from the antrum with fistula in the post-upper quadrant, especially when adhesions bind the drum remnants to the inner tympanic wall. 2. The discharge of gritty cholesteatomatous masses. 3. Otorrhœa with symptoms of beginning pulmonary consumption. The statistics embrace sixty cases. The indication, duration of after-treatment, and results as to healing are given. Finally the origin of endocranial otogenic complications is discussed. POLLAK.

296. KÜSTER has practised the so-called osteoplastic operation on eight patients. A tongue-shaped flap is made behind the ear, commencing above behind the ear down around the mastoid tip, and ascends along the posterior border of the mastoid down to the bone; the periosteum is elevated along the border and a thin bone plate adherent to the skin and periosteum is chiselled free; the flap is turned up and the mastoid is opened according to the method described by Küster in 1889. The flap is replaced and sutured except below, where a piece of bone is removed from the bony plates to permit gauze drainage. Advantages of the operation: No deformity except a thin scar, more rapid healing, finally safety of the antiseptic tamponade in injury to the sinus or dura, restoration of the bony outline, and in place of the deep furrow usually remaining after the ordinary opening there is a well-formed bone. The difference is so great that any one com-

paring the results of the two methods will not have any doubt as to the value of the osteoplastic method. Nine case histories and one illustration are added.

BRÜHL.

297. The impracticability of Küster's method is demonstrated step by step in a very lucid and objective manner. The method described in 1889 suffers from an incomplete exposure of all the middle-ear cavities, and from the impracticable narrowness of the newly formed wound canal. The so-called radical method obviated these difficulties where the cavity was not allowed to fill with granulations but was clothed with skin. The new method, the osteoplastic, rests on the mistake that a deformity always follows the radical operation, while the opposite is the case, as, with aid of the plastic procedures, the wound can be sutured at once, which leaves only a thin scar. Granted that the osteoplastic method leads to cure, it would if accepted mean a loss of ten years' labor in otology. In full recognition of Küster's merits the author concludes as follows, in which he has the support of all otologists: "I have well considered the matter before I opposed the views of the meritorious Marburg surgeon. I consider it my duty, for if Küster's suggestions are accepted, completely wrong impressions on the value of the radical operation will arise."

BRÜHL.

298. PANSE opposes Küster's proposition and says it means such a marked step backward that it cannot be too soon warned against because (1) the technic is bad (one facial paralysis, injury to the sinus); (2) the result is cosmetically inferior to Stacke's or Panse's plastic. Healing did not take place in one third of the cases.

299. KÜSTER's reply to the preceding, without furnishing any new features to the question.

BRÜHL.

C.—CEREBRAL COMPLICATIONS.

300. GRADENIGO. On the diagnosis and curability of otitic leptomeningitis. *Arch. f. Ohrenhkl.*, vol. xlv., p. 155.

301. MÜLLER, R. On the operative treatment of otitic meningitis. *Deutsche med. Wochenschrift*, No. 45, 1899.

302. FERRERI. Severe peri- and endocranial complication after acute otitis running a chronic course. *Arch. ital. di Otol.*, vol. ix., p. 49.

303. KIRMISSON. Cerebral abscess. *Le progrès médical*, Nov. 18, 1899.

304. KADJAN. Abscess of the temporal lobe of the brain. Letopiso russkoi chirurgii. Two autopsies. *Fourn. Am. Med. Assoc.*, Nov. 11, 1899.

305. JÜRGENS. Streptomycosis of the ear. *Monatschr. f. Ohrenhkl.*, 1899, No. 11.

306. YOUNG, ARCHIBALD. Remarks upon the operative treatment of infective thrombosis of the sigmoid sinus following chronic purulent otitis media. Record of case successfully treated. *Glasgow Med. Fourn.*, Oct., 1899.

307. SCHRAGA. Sinus-phlebitis from chronic otitis; operation; recovery. *Monatschr. f. Ohrenhkl.*, No. 10, 1899.

308. MEIER, E. Otitic pyæmia. *Münchn. med. Wochenschr.*, No. 43, 1899.

309. RANDALL, B. ALEX., and ADAMS, JEANNIE S. Lateral sinus-phlebitis after otitis media in typhoid fever. *University of Pa. Med. Magazine*, Dec., 1899.

310. RANDALL, B. ALEXANDER. Four cases of cerebellar abscess. One success. Two autopsies. *Fourn. Am. Med. Assoc.*, Nov. 11, 1899.

300. GRADENIGO reports four cases.

I. Chronic bilateral purulent otitis since childhood, right perisinuous abscess, and beginning thrombosis of transverse sinus; death from basilar meningitis. A girl fourteen years old, jaundiced when admitted to the hospital, hard of hearing for one year; the left canal was occluded by a polyp. From the twentieth day after the radical operation constant fever, headache, vomiting, nystagmus, stiff neck, facial paralysis on the right side, delirium, and coma. The autopsy showed the above condition on the right side. There was pus in the right int. auditory meatus. Gradenigo believes that the concussion of the operation on the left ear may have produced the lesion on the other side.

II. Woman, twenty-seven years old, with left-sided otorrhœa since youth, and transient facial paralysis. Recurring polypi, meningeal symptoms. Operation: empyema of antrum; the sinus was exposed but appeared healthy. On probing in an upward direction considerable discharge of pus from an extradural abscess above the antral roof. After removal of the latter the dura of middle fossa was found covered with granulations and a purulent membrane. Operation interrupted. High fever, continuous meningeal symptoms. Second operation: the dura ex-

posed to healthy parts and the middle-ear cavities thoroughly exposed, removing cholesteatoma and granulations. Recovery.

III. Boy thirteen years old, acute otitis media in left ear for two weeks, high fever, meningeal symptoms. Mastoid process was normal. Paracentesis evacuated much pus. No improvement. Lumbar puncture: in the cloudy cerebro-spinal fluid leucocytes and very virulent staphylococci. Gradual recovery.

IV. A woman, thirty-five years old, right cholesteatoma, otorrhœa for nine years, fever during last two weeks and recently meningeal symptoms. Bulging of posterior and upper wall. Lumbar puncture showed a fluid with many white blood corpuscles and staphylococci. At operation cholesteatomatous masses were removed from antrum and middle ear. Dura free. Later facial paralysis. Ocular fundus hyperæmic. Nine days later fever disappeared and gradual recovery set in. Gradenigo believes the lumbar puncture to have a curative effect and that packing the wound with two per cent. carbolic gauze is very favorable.

BLOCH.

301. MÜLLER reports two cases of serous meningitis, of which the one is chronic externa and the other ventricular or acute interna.

I. Mening. serosa ext. chron. An otherwise healthy girl was taken ill in April, 1895, with mastoiditis, following ac. otitis media. Simple operation, healed at Christmas, 1895. Moderate headache and vertigo. In Sept., 1898, sudden aggravation of all symptoms, though the ear did not again suppurate. The radical operation exposed a large cavity, completely empty, with black, necrotic, absolutely dry walls in the mastoid process below the scar. An abscess in the temporal lobe was suspected and a number of punctures were made through the dura; no pus, but some serous fluid. Incision with a knife to a depth of 3 *cm* was also negative. A trephine opening was made through the squama. On opening the dura, a quantity of serous fluid escaped, but no pus. The escape of fluid continued during recovery. Two months later the brain wound was healed without any prolapse, and two months later the ear wound was also completely healed. A complete recovery has not, however, taken place, as vertigo, imperfect locomotion, reduced sensation of the crossed side, and the recent aggravation (increased headache, vomiting, tenderness on percussion of the left hemisphere, normal eye-ground, pulse, and temperature) persisted, though the operation on Sept. 15, 1898, can

be regarded as a life-saving procedure. These symptoms are probably due to a chronic inflammatory serous infiltration of the brain substance, especially of the temporal lobe, as a result of the non-purulent, necrotic disease of the mastoid process.

II. Mening. seros. interna acuta. Woman thirty-one years old, mother of three healthy children, was taken ill with meningeal symptoms suggestive of a brain tumor, though she had had otorrhœa for many years. The radical operation was performed on account of the otorrhœa and the tenderness of mastoid. The antrum contained cholesteatoma, but trephining of the temporal lobe proved negative. The general condition did not improve; after a few days the region over the cerebellum was trephined, but again no pus was found. No improvement. An enormous cerebral prolapse appeared at both openings. Four weeks later, a gradual improvement of all symptoms began with a serous transudation of the bandage; complete recovery in three months. The diagnosis of meningitis serosa interna, with exudation into the ventricles, was made by exclusion, and puncture of the ventricles is advocated in this and similar cases. No brain symptoms remained, notwithstanding the great loss of brain tissue. The author believes that the trephine openings should be made away from the wound of the radical operation, to guard against infection of the brain hernia by the otorrhœa. NOLTENIUS.

302. Report of two cases with severe complications without revealing any involvement of the mastoid processes. It is supposed that in both cases the tubal cells described by Bezold were affected and caused the deep abscesses in the neck and pharynx. Most of the symptoms were referable to the deep parotid region. The operative treatment of analogous cases is discussed.

A case of extradural abscess after acute otitis media without mastoid disease is also described. The author is in favor of operation through the ear. GRADENIGO.

303. KIRMISSON showed a patient before the Paris Surgical Society on whom he had operated on account of brain abscess. The pus contained streptococci; healing was uneventful, but the half-sided paralysis and contracture remained for some time. The contracture and paralysis disappeared almost completely with massage. SCHWENDT.

304. Acute suppurative otitis after follicular tonsillitis. One month later mastoiditis, and at the same time the characteristic

symptoms of an abscess in the temporal lobe. Operation. Healing. SACHER.

305. A soldier who had had a chronic purulent otitis and mastoiditis succumbed to a thrombosis of the left transverse sinus, meningitis, rapid softening in the temporal lobe, and septicæmia. Pure cultures of streptococci were found in the softened areas of the brain, in the antrum and mastoid cells, labyrinth, and middle ear. KILLIAN.

306. YOUNG'S case was that of a child two and a half years of age, the chief interest being that recovery took place without ligation of the internal jugular vein, the sinus being incised and the septic contents turned out. The thrombosis occurred high up, at the knee of the sinus. ARTHUR CHEATLE.

307. At the operation the sinus was found surrounded with pus. It was opened three days later, when distinct pyæmic symptoms had supervened. Ligation of jugular vein. The sinus contained soft, brownish-red masses of thrombus. Later several pyæmic abscesses had to be opened. Recovery. KILLIAN.

308. Report of eight cases of pyæmia, all due to sinus thrombosis ; of these three had previously been reported. In all cases operation was performed ; twice the jugular was ligated. In three the otitis was acute ; one of these was fatal. In four the otitis was chronic, with a mortality of two. MEIER agrees entirely with Leutert's explanation for the development of pyæmia. SCHEIBE.

309. In this case, after three months of malaise, typhoid fever developed which was later complicated by the occurrence of middle-ear inflammation. The otitis never became purulent in character in the right ear, though reported at times puriform in the left ear. During the course of the fever, superficial furuncular abscesses formed over the sacrum and shins, but no rigors, sweating, or characteristic septic temperature were noted. Some ten days after the crisis a relapse occurred, the pyrexia beginning with the only approach to a rigor observed. Later, while apparently convalescent for a period of two weeks, clear signs of an inflammation of the right mastoid and lateral sinus developed, which disappeared in three days without operation and was followed by an uninterrupted recovery. CLEMENS.

310. CASE 1.—The patient, fifteen years of age, had a discharging ear for three years. A box on the ear three days pre-

vious to the consultation was followed by nausea, pain, and malaise. The mastoid was red, tender, and swollen; marked fluctuation, temperature 106° F., appearance anxious and serious. Immediate operation refused. Mastoid opened next day. Incision through soft parts evacuated two drams of pus, surface of bone intact. Mastoid sclerosed, pus found with little caries when antrum was reached. No sinus was detected leading to adjoining parts. Antrum curetted and packed. Temperature fluctuated, eye-ground normal. With a temperature of 103° F., pleural friction was detected with rapidly following effusion and lung consolidation. No rigors, no jugular tenderness, no swelling about the neck. Patient died six days after operation and thirteen days after the injury.

Autopsy, twenty-four hours after death, showed amazing destruction of both lungs, pleural empyema, dura engorged and adherent, pia clouded. Two drams of pus evacuated upon removing the brain, owing to cerebellar abscess. Dura intact. Doubtful evidence of phlebitis. Cerebellar abscess size of pigeon's egg, with thick pyogenic membrane, thinnest in proximity to the antrum. Abscess may have antedated the injury.

CASE 2.—Patient fourteen years of age. Had suppuration for two months; granulations found over the posterior wall of auditory canal. Operation showed the posterior osseous wall largely destroyed, mastoid one large cavity, sigmoid sinus large and somewhat forward, bony covering destroyed for one inch and covered by granulation. Considerable caries of inner plate. Slight subdural pus; two square inches of the dura exposed. Healthy bone was reached in all directions during the operation. The patient's general condition was bad, but after ten days was discharged and attended the clinic. Two weeks later, an abscess formed at the clavicle which was evacuated and a sinus was followed upwards for two inches. Healing occurred rapidly below but oozing from mastoid sinus continued. The appetite failed, with occasional vomiting, other serious symptoms following. With a sub-normal pulse of seventy-six (76), temperature of 98° F., cerebellar abscess was expected and operated for. The operation extended deep into the middle and cerebellar fossæ. An accident to the mastoid vein by rongeur prevented further exploration. Patient died. No autopsy.

CASE 3.—Child of six years of age with middle-ear suppuration. The mastoid was opened, carious bone and granulations

removed. At a dressing of the wound a rough, overhanging edge of the cortex was scraped smooth and a small bone sinus found, which led to an abscess cavity about one *cm* in diameter, in the cerebellum. Healing was exceedingly slow, but the patient was ultimately discharged cured.

CASE 4.—A child four years of age. Suppuration of the right ear followed by mastoid abscess, which had been incised three weeks before case came under observation of writer, leaving a discharging sinus behind the ear. Much headache on the right side. Condition became serious later, with vomiting, convulsive twitchings of left arm and leg, without paresis. Little mental disturbance. Temperature 98.4° F. Respiration 20. Pulse 88. Mastoid was opened, carious bone and granulations removed, and, as no defect of the inner table could be detected, further operation was delayed. Death.

Autopsy: An excess of fluid in the arachnoid and ventricles was found. Cerebellar abscess about 3 x 5 *cm* occupied nearly the entire lobe.
J. B. CLEMENS.

d.—OTHER MIDDLE-EAR AFFECTIONS.

310a. ARSLAN. Several syphilitic varieties of the cartilage of the Eustachian tube. *Arch. ital. di Otologia*, etc., vol. ix., p. 9.

311. STUCKY, J. A. Fractured base, with deafness, tinnitus, exophthalmus, facial paralysis, mastoiditis. *Four. Am. Med. Assoc.*, Nov. 11, 1899.

310a. ARSLAN presents observations of a clinical picture of hyperplasia of the mucous membrane and the cartilage of the Eustachian tube in tertiary or hereditary syphilis. The most constant symptom is the loss of hearing from tubal stenosis; this does not correspond to increase in volume, which is not recognizable in the rhinoscopic examination; it is probably produced by the extension of the disease to the walls of the tube. Specific treatment gave the best results.
GRADENIGO.

311. Case of a jockey, twenty-one years old, who was thrown from a horse and sustained a large contusion of the scalp over the vortex, which was rapidly followed by œdema, extending down to both ears, though more marked on the right side. Tinnitus and deafness in right ear, no hemorrhage from nose and throat. Five weeks after the injury exophthalmus of right eye developed, hemorrhagic spots in deep conjunctiva, dimness of

vision, eye-ground negative. Complete facial paralysis, swelling of mastoid integument, tenderness over antrum and tip of the bone. Auditory canal red and swollen, bulging posterior superior wall. Perforation of the drum, in the superior posterior quadrant, and discharging offensive pus. Constant headache ; vertigo, falling toward the left ; aphasia.

A Stacke-Swartz operation was performed, and the attic, middle ear, antrum, and cells found full of firmly adherent clots : no pus ; no caries. Malleus was found separated from the drum and incus from the stapes. The clots and inflammatory products were thoroughly removed, cavities cleaned, and the mastoid dressed in the usual way. All symptoms but the facial paralysis disappeared after the operation. Recovery was uninterrupted.

J. B. CLEMENS.

NERVOUS APPARATUS.

312. LANNOIS, E., and HARDOUR, M. On true hysterical deafness. *Ann. des mal. de l'oreille*, etc., No. 10, 1899.

313. ALT. On psychic deafness. *Monatschrift f. Ohrenheilk.*, No. 12, 1899.

314. FERA. A case of monolateral multiple progressive paralysis of the cranial nerves. *Arch. ital. di Otol.*, etc., vol. ix., p. 34.

312. LANNOIS and HARDOUR endeavor to separate the clinical pictures of hysterical deafness from other affections which are somewhat similar. The following should not be confounded with the true hysterical deafness : (1.) Hysterical deafmutism ; (2.) inattention of deaf persons due to psychic depression (*désperance auditive*). The deaf one, discouraged by his unsuccessful attempts to hear, gives up all efforts.

True psychic deafness is complete or nearly complete. It occurs without a material change being present in the ear, and forms the principal symptom of a general neurosis. Recovery follows spontaneously or after a psychic treatment. The author describes two cases of male hysteria. The main symptoms are the following : 1. The degree of deafness is greater than that associated with middle-ear diseases ; the deafness corresponds to labyrinthine or nerve deafness. 2. Bone-conduction is abolished. 3. The drum membrane appears normal. 4. Insuction of the drum membrane is inconstant. 5. The disease is of equal intensity on both sides. 6. Subjective symptoms are of only short

duration. 7. Usually other symptoms of general hysterical neurosis are present, anæsthesia, contraction of visual field, etc. 8. A radical cure follows. SCHWENDT.

313. An historical and critical discussion on the above theme. KILLIAN.

314. Man fifty years old, with complete left-sided facial paralysis with pains and tactile anæsthesia of the left half of the face. Loss of hearing, left, due to the affection of sound-conducting and nervous apparatus. Complete paralysis of the left vocal cord. Later, necrosis of the left cornea and movements of deglutition. Death from inspiration pneumonia. At autopsy a sarcoma of the left middle fossa of the skull, extending to the anterior and inner part of the posterior fossa, to the left half of the sphenoidal cavity, and the posterior end of the middle turbinal. The tympanum was free. The left basal nerves are compressed and invaded with tumor masses. GRADENIGO.

NOSE AND NASO-PHARYNX.

a.—GENERAL PATHOLOGY.

315. REUTER. Essential anosmia. *Arch. f. Laryng.*, vol. ix.

316. PLACZEK. Congenital absolute bilateral anosmia. *Biol. klin. Wochenschr.*, No 51, 1899.

317. FRÄNKEL. Open mouth and short upper lip following shortening of frenulum labii superioris. *Arch. f. Laryng.*, vol. ix.

318. CORDES. Muroid degeneration of the epithelium of glandular ducts in the nasal mucous membrane. *Arch. f. Laryng.*, vol. x.

319. ZUCKERKANDL. On the development of the concha bullosa. *Monatschr. f. Ohrenheilk.*, No. 10, 1899.

315. REUTER divides the essential anosmias with probable anatomical causation in three groups after their etiology: 1. The anosmia remaining after the complete extirpation of genuine nasal polypi; 2. The anosmia in chronic ethmoiditis; 3. The anosmia in ozæna. In the first class, while in many cases the smell returns after the removal of polypi, it may be permanently damaged. ZARNIKO.

316. A woman, sixty years of age, had never possessed the faculty of smell. There were no changes in the local condition nor in the nervous system. A similar case is described in a man

forty-four years of age. These two, besides a case of Zwaarde-maker's, are the only ones on record. MÜLLER.

317. FRÄNKEL observes three successive cases of the mouth being kept open from abnormal shortness of the frenulum labii sup. The maxillæ and lips were normal. The deformity was permanently cured by simple division of the band with the scissors. He suggests the name of mikrocheila. ZARNIKO.

318. CORDES has studied the bud-like structures, first described by the reviewer, then by Birmingham and Okada, which occasionally occur in hyperplastic epithelium of the nasal mucous membrane. These are not independent mucous glands but belong to normal mucous glands caused by the muroid metamorphosis of the cells surrounding the excretory duct in the epithelium. ZARNIKO.

319. The cavities in the middle turbinates may be continuations of the upper-middle meatuses or of a bulla cell or of an anterior frontal cell. There are usually one, and sometimes two or three of these cavities.

The paper of Bergeat (*Münch. medic. Wochenschrift*, 1897) seems to have escaped ZUCKERKANDL's attention. KILLIAN.

b.—METHODS OF EXAMINATION AND TREATMENT.

320. BOCK. Experiences with electrolysis, especially in nasal therapeutics. *Berl. klin. Wochenschr.*, No. 45, 1899.

321. BAUMGARTEN. Schleich's procedure in operations of the deviations and spurs of the septum. *Arch. f. Laryngol.*, vol. ix.

322. BREITUNG. The importance of the electric internal drum massage of the nasal mucous membrane for the general physician, and its technic. *Deutsche Medizinal-Zeitung*, No. 96, 1899.

323. BAUMGARTEN. The bloody treatment of hypertrophies in chronic rhinitis. *Wiener med. Presse*, No. 46, 1899.

320. BOCK's experience with electrolysis in ozæna are not encouraging; the method is, however, of value for cosmetic purposes (warts, nævi, calcified atheromata, etc.). It is especially serviceable in deformities of the septum, and, according to Brock, combines all the advantages of other methods and should be employed except in especially prominent traumatic deviations or where the necessarily prolonged treatment (six to seven weeks) is no objection. MÜLLER.

321. BAUMGARTEN operates on septum deformities with a chisel and painlessly from the use of Schleich's injections. Hem-

orrhage is also reduced, though it is more profuse later and requires careful tamponade. Schleich's method is also described in the division of synechiæ and in tracheotomy. ZARNIKO.

322. BREITUNG has modified the apparatus for vibratory massage, by which the action is made more uniform. This massage is supposed to correct all disturbances due to increased intracranial pressure, and to cure nervous coryza. It exerts a favorable action on ozæna and not only opens but keeps the ostia of the Eustachian tube open. HARTMANN.

323. BAUMGARTEN recommends removal of hypertrophies with the angular scissors without cocaine. POLLAK.

c.—OZÆNA.

324. COZZOLINO. A study of the bacteriology and histology of ozæna. *Ann. des mal. de l'oreille*, etc., No. 7, 1899.

325. PEWNIZKI. Treatment of ozæna with diphtheria antitoxin. *Wojenno medizinsky Shurnal*, Sept., 1899.

324. According to COZZOLINO, ozæna is due to a primary nutritive disturbance of the bony turbinals, to which is associated secondarily a bacterial infection. The latter is caused by the bacillus mucosus, which produces the fever and crusts.

ZIMMERMANN.

325. Three cases which received no other treatment than the serum injections. The results were absolutely negative. Electrolysis was also tried. After two or three sittings a complete cessation of the fœtor occurred. The method is, however, painful, and only temporary. SACHER.

d.—ACCESSORY SINUSES.

326. WROBLUOSKI. Acute empyema of the antrum of Highmore. *Arch. f. Laryng.*, vol. x.

327. RETHI. Negative air-douche as diagnostic aid in diseases of the accessory cavities. *Wien. klin. Rundschau*, No. 43, 1899.

328. GRÜNWALD. On the curability of inflammations of the maxillary antrum. *Arch. f. Laryng.*, vol. ix.

329. LICHTWITZ. Sequestrum developing about the operative canal, in the operative treatment of maxillary empyema through the alveolus. *Arch. internat. de lar., d'ot.*, xii., 4.

330. STRAZZA. Clinical remarks on the chronic inflammations of the frontal sinus, especially as to treatment. *Arch. ital. di Otol.*, etc., vol. viii., p. 361.

331. LUC. A case of unusually obstinate frontal empyema. *Arch. internat. de lar., d'otol.*, xii., 4.

332. CAUBET and DRUAULT. Meningitis and orbital abscess following a polysinusitis of dental origin. *Ann. des mal. de l'or., du lar.*, xxv., p. 8.

333. KOEBEL. Combination of otitis media with rhinogenic brain abscess. *Beiträge zur klin. Chirurgie*, xxv., 2.

334. LAFRANÇOIS. Ethmoid empyema with orbital complications. *L'année médicale de Caen*, Sept. 15, 1899.

335. FERRERI. Fibrosarcoma of sphenoidal sinus. *Arch. ital. di Otol.*, vol. viii., p. 445.

336. GRUNERT. A new plastic method after complete exposure of the frontal sinus for empyema. *München. med. Wochenschr.*, No. 48, 1899.

337. KYLE, D. BRADEN. Confined suppuration of the frontal sinus with spontaneous rupture. *N. Y. Med. Jour.*, Dec. 16, 1899.

327. The use of the negative Politzer's experiment requires only a few seconds and often succeeds. The nose is first cleaned and dried, cocainization of middle meatus. Some water is held in the mouth, the nozzle of the compressed bag introduced in the nostril ; during deglutition the bag is allowed to expand. It succeeds almost always in diagnosing accessory sinus disease. If no discharge appears, iodide of sodium is administered for two to three days to produce a profuse discharge, and the experiment is repeated.

POLLAK.

328. GRÜNWARD has examined 106 cases with view to duration, character of secretion, condition in nose and of the teeth, and various complications. In general there is an inverse proportion between duration of disease and result of treatment. Not the catarrhal but the purulent forms are more favorable for healing ; unfavorable are those with the ozæna complex (broad nose, crusts). Complications with polypi mean severe disease of the mucous membrane and make the prognosis worse. Contiguous diseased teeth make a permanent cure impossible. The prognosis is better if the tooth trouble is immediately recognized and treated. Some cures are prevented by diseased roots of normal-appearing teeth. Other remarks on the complication with suppuration of other accessory cavities, bilateral disease, the conditions within the cavity (polypi, polypoid excrescences,

diverticula) follow. Regarding therapeutic measures, the author does not think much of simple perforation, and employs it only where disease of the teeth or a defect at the corresponding place is present, in not too inveterate cases in young rather than old individuals, in catarrhal rather than purulent forms. Of operations with broad exposure he reserves Bönninghaus's method for the severest cases. Finally he emphasizes that many catarrhal diseases will get well by correcting the intranasal changes.

ZARNIKO.

329. The antrum of Highmore was opened from an alveolus with the electric trephine. Four weeks later, after pain had existed since the third day, an annular sequestrum was discharged. LICHTWITZ believes that the necrosis was due to overheating from too rapid moving of the trephine.

ZIMMERMANN.

330. STRAZZA reports 5 cases and discusses the diagnostic features and treatment of chronic frontal empyema. Even though both sides were affected, the symptoms were only on one; the septum was always present, but softened in 2 cases and thinned in 1. In a certain number it is impossible to introduce a canula in the natural passage; even if successful, it is painful, and the curative action of irrigations is very small, especially as, in most cases, the sinus is filled with polypi. For radical treatment broad external exposure is recommended, so that the soft parts may fall back and the cavity be obliterated. No attention is paid to cosmetic reasons. It is necessary to remove all fungoid masses and the purulent focus. The author is against immediate closure of the wound and tampons until a granulating surface has formed. It is not necessary to pay any attention to the nasal duct.

GRADENIGO.

331. A patient, twenty years old, had been operated on twice for frontal empyema with primary suture; the suppuration returned and extended to the other side. At the third operation both sinuses were exposed, the anterior ethmoid cells curetted, and the wound was again closed. Six weeks later fluctuation appeared over the left eye, which was opened and drained. The fistula closed after three weeks, though pus still collected. Luc put on a pressure bandage, with the result that at the next dressing the fluctuating had extended to the scalp limits. Several periosteal and an extradural abscess were formed, which was operated on. The patient finally died from meningitis. Luc has successfully operated on twelve frontal empyemata, and claims

that the failure in this case was due to constitutional peculiarities of the patient, for which there seem to be no reasons whatever.

ZIMMERMANN.

332. The sickness began like influenza, with coryza; then fever, vomiting, severe headache, painful œdema of the eyelids appeared. The incision of the lower lid evacuated a drop of pus, and no carious bone could be detected at depth. Death ensued after delirium. Autopsy showed a basal meningitis (right) especially in Sylvian fissure, produced by a small destruction of bone in the anterior part of the sella turcica. This led into the left sphenoidal sinus, which was distended to the right and filled with pus. The ethmoid cells and maxillary antrum were likewise affected, and into the latter projected a carious tooth. The ocular symptoms were caused by the transmission of the cavernous sinus and the ophthalmic vein.

ZIMMERMANN.

333. A male, thirty-three years old, suffered from right chronic otorrhœa and bilateral purulent discharge from the nose; two weeks later 38.4°, vomiting, headache, vertigo, stupor, twitches in left arm. No tenderness over mastoid or forehead. Suspecting otitic brain abscess, trephine opening in squama, brain incised, no pus. Antrum opened, found filled with pus. Radical operation. Death after several hours. At autopsy, caries of posterior wall of right frontal sinus and abscess in right frontal lobes were found. Publication of hitherto reported cases (20) of rhinogenic frontal abscess and their symptoms.

BRÜHL.

334. A boy, four years old, fell on his nose and had headache for three days. Six months later, he was again taken ill with fever and became stuporous; left eyelid œdematous, slight exophthalmos. Examination of nose negative. As an osteoperiostitis of the inner orbital wall was suspected, an incision was made at level of inner canthus. A probe encountered ethmoid cells filled with pus. A broad opening was made between the ethmoid cells and the nose. Recovery.

SCHWENDT.

335. FERRERI concludes as follows: a sphenoidal empyema should be diagnosticated as early as possible and operated upon, lest fatal intracranial complications follow. It is necessary to differentiate between a pyogenic inflammation and a neoplasm, as the same symptoms may be produced by either for a long time.

GRADENIGO.

336. After eradicating the frontal sinus by Kuhnt's method,

at both ends of the supraorbital horizontal incision, vertical incisions are made passing above and below. By undermining, two flaps are thus formed. The upper flap is placed in the frontal cavity after the epidermic layer has been removed, and the lower is pulled over this and sutured to it after being changed to a wedge shape. This method has been employed in one case with good cosmetic result. GRUNERT recommends his procedure only when the cavity is not too deep. SCHEIBE.

337. A woman, æt. sixty, experienced a fulness on the left nasal side, thin nasal watery discharge, swelling over the face, particularly between the eyes, and soreness at the inner angle of the left eye. The swelling increased, the nasal discharge became more pus-like, and malaise and general debility ensued. The patient had lost over thirty pounds in flesh. The swelling increased so much as to hang down over both supraorbital ridges, with marked swelling under both eyes. In the median line, an inch and a half above the line of the supraorbital ridge, was a tumor-like red projection, pitted in the centre with a small spot showing some dried secretion. In removing the dried crust an opening was found, and upon pressure foul-smelling, thick pus was discharged. The necrotic area was almost circular, $\frac{1}{4}$ inch in diameter. A probe passed easily through the nose. The outer opening closed spontaneously after two months. The necrosis had involved the outer plate only. M. TOEPLITZ.

c.—OTHER DISEASES OF THE NOSE.

338. LERMOYEZ. The treatment of nasal hydrorrhœa with atropine and strychnine. *Ann. des mal. de l'or., du lar.*, xxv., 7.

339. FREUDENTHAL. Excessive epistaxis controlled by local injections of gelatine. *Deutsche med. Wochenschr.*, No. 49, 1899.

340. FEDOROW. Forced dilatation of the chest as a means of checking epistaxis. *Bolnitschnaja gaseta Botkina*, No. 29, 1899.

341. COTTELL, A. B. Hemorrhage through the lachrymal duct after plugging the nares. *Brit. Med. Jour.*, Dec. 16, 1899.

342. GREEN, W. E. Case of rhinolith. *Brit. Med. Jour.*, Nov. 4, 1899.

343. MORF. Contribution to the etiology of the genuine fibrinous rhinitis. *Correspondenzblatt f. Schweizer Aerzte*, 1899.

344. HEINDL. On the treatment of rhinoscleroma or scleroma. *Ann. des mal. de l'or., du lar.*, xxv., 7.

345. MANASSE. On multiple amyloid tumors of the upper respiratory passages. *Virchow's Archiv.*

346. SEIFERT. Tuberculosis of naso-lachrymal canal. *Munch. med. Wochenschr.*, No. 52, 1899.

347. The relation of pathological conditions in the ethmoid region of the nose, and asthma. SWAIN, HENRY L., Pathology, *N. Y. Med. Jour.*, Oct. 28, 1899; RICE, CLARENCE C., Clinical Phases, *N. Y. Med. Jour.*, Nov. 11, 1899; BOSWORTH, F. H., Treatment, *N. Y. Med. Jour.*, Nov. 18, 1899.

338. LERMOYEZ has returned to the purely medical treatment of vaso-motor coryza; he recommends strychnine, atropine, $\bar{a}\bar{a}$ 0.005 to 400 syr., 1-3 teaspoons daily. Of 27 patients treated in this manner 14 could be re-examined and 11 proved to be cured.

ZIMMERMANN.

339. A woman, sixty-eight years old, suddenly was taken with profuse epistaxis. Attempts at checking the bleeding with packing anteriorly and later posteriorly were only temporarily successful. The dangerous condition was avoided by an infusion of salt solution in the intra-clavicular subcutaneous tissue. The hemorrhage did not cease until 20-30 ccm of fluid-warm gelatine was injected into the nose with a warmed glass syringe.

NOLTENIUS.

340. FEDOROW has found the following method the best: the patient sits upright on a chair, places both arms on his head, and takes long, deep breaths with mouth open.

SACHER.

341. A soldier who was much debilitated had a severe attack of epistaxis, necessitating plugging. As a result, blood appeared in each lower eyelid and trickled down the cheeks.

ARTHUR H. CHEATLE.

342. At a meeting of the Southern Branch of the British Medical Association, Isle of Wight Branch, held October 20th, GREEN showed a rhinolith which he had removed from a girl who had been troubled with her nose for years. The stone, which occupied the nose and naso-pharynx as far as the pharynx, was crushed with strong polypus forceps and removed in five or six pieces. Three months later, the symptoms having recurred, a thin ragged plate about 1 inch long, $\frac{1}{2}$ inch wide, and $\frac{1}{8}$ inch thick, was removed from near the back of the nasal cavity.

ARTHUR H. CHEATLE.

343. MORF collected all cases of fibrinous rhinitis from the literature and added three of his own. These are his conclusions:

Genuine fibrinous rhinitis is not to be distinguished etiologically, anatomically, or clinically from diphtheria, hence the same protective measures are required for either.

In the author's cases, virulent Löffler's bacilli were found in the pseudo-membranes. Recovery followed the use of antitoxin.

In several cases described by others, no Löffler's bacilli were found, but staphylococci and streptococci. According to the author, it is possible that the Löffler's bacilli were overgrown by the other cocci so that they no longer were present in the pseudo-membranes.

SCHWENDT.

344. Of the eleven cases described, nine concerned the nose and naso-pharynx; in all cases typical rhinoscleroma bacilli were found. Treatment consists in restoring the nasal respiration with avoidance of destruction. The infiltrates and tumors were curetted, bands were divided and kept from reuniting by packing with gauze.

ZIMMERMANN.

345. MANASSE has examined microscopically a case of infiltrating amyloid tumors of the larynx and trachea, and a nodular tumor in the right palate, tonsil, and larynx.

BRÜHL.

346. Fourteen cases, of which thirteen belonged to the eye clinic. In five cases the tubercular process was localized to the lachrymal canal; in the other cases the conjunctiva or cornea was also affected. In all fourteen cases the nose was also involved. Secondary tuberculous inflammations of the lachrymal canal from the nose are the most frequent.

SCHEIBE.

347. SWAIN holds that in asthma there must be first an irritability of the bronchial structures, secondly some other diseased organ, such as the nose, stomach, ovary, etc. And thirdly, the neurotic habit. The cause is found outside of the body, in certain irritations, as, *e. g.*, the pollens of grasses in hay fever, flour in baker's asthma, or in the musty smell of feathers, the last being illustrated by a case of a young man, *æt.* twenty-eight, whose asthma and even cedematous swelling of the middle turbinate disappeared after the change of his feather pillow. Swain then gives an elaborate theory upon the production of this cedematous tissue and how it produces asthma.

RICE believes that ethmoid diseases are not often associated with periodical asthma. The coexistence of asthma and ethmoidal disease is due to mechanical obstruction, necessitating mouth-breathing, and to the supervening chronic catarrh of the entire respiratory tract. Temporary asthma occurs during acute

congestive exacerbations, due to atmospheric changes and to derangement of the circulatory and digestive apparatus.

BOSWORTH asserts that a diseased condition of the nasal mucous membrane tends to produce disease of the bronchial mucous membrane. Asthma is due to a vasomotor paresis of the blood-vessels of the mucous membrane of the bronchial tubes. Polypoid degeneration, oedematous hypertrophy of the nasal mucous membrane, and nasal polypi indicate ethmoiditis. If we remove these conditions, we do not cure the asthma, which can only be remedied by radical treatment of the ethmoid, viz., to relieve the intracellular pressure by breaking down the trabecular walls by means of the burr.

M. TOEPLITZ.

f.—NASO-PHARYNX.

348. LUZZATO. On the histology of the hypertrophic pharyngeal tonsil. *Arch. ital. di Otol.*, etc., vol. viii., p. 394.

349. LEWIN, L. Tuberculosis of the pharyngeal tonsil. *Arch. f. Laryng.*, vol. ix.

350. DE SIMONI. Adenoid vegetations according to the new views of Hertoghe. *Bolletino delle mal. del' orecchio*, 1899, p. 491.

351. MICHALKIN, P. Treatment of a fibrous naso-pharyngeal polyp with electrolysis. *Medicinski obosrnj.*, No. 5, 1899.

352. INGALS, E. FLETCHER. Fibrous tumor of the naso-pharynx; sequel. *N. Y. Med. Jour.*, Dec. 16, 1899.

348. LUZZATO examined the peculiarities of the epithelium and observed emigration of leucocytes in well-preserved ciliated epithelium and in squamous epithelium, as opposed to Stöhr's view. The author could not confirm McBride and Turner regarding the flattening of the epithelium. A simple hypertrophy of the adenoid tissue was found in all (fifty) cases. There were no sclerotic areas, but numerous hemorrhages and cysts. In two tubercular changes were present; one of these caused tubercle in the guinea-pig.

GRADENIGO.

349. LEWIN places the following questions: 1. With due regard to all the circumstances which govern the relationship of a process to tuberculosis, how often does tuberculosis hide itself under hyperplasia of the pharyngeal tonsil? 2. By histological examination of pharyngeal tonsils, removed post-mortem from phthisical subjects, how often are they tubercular? These are the conclusions: 1. In our experience tuberculous foci are present in

about 5 per cent. of cases of hyperplastic pharyngeal tonsils. 2. The tuberculosis is in the so-called tumor form of mucous membrane tubercle ; it is characterized by the absence of all externally recognizable marks, the so-called latent tuberculosis of the tonsils. 3. This latent tuberculosis may be the first and only localization of tuberculosis in the patient. 4. It is usually associated with tuberculosis elsewhere, especially of the lungs, which may not be manifest at the time of operation. 5. It is a comparatively frequent condition in pulmonary tuberculosis. 6. It may attack normally large as well as hyperplastic tonsils. 7. It is a relatively unimportant factor in the etiology of pharyngeal tonsillar hypertrophy. 8. It can be definitely overcome by elimination of the tonsil even in simultaneous pulmonary affection.

This very careful paper was written with the guidance of Professor Brieger. ZARNIKO.

350. DE SIMONI endeavors with theoretic reasonings to connect adenoidism and thyroidism. He regards adenoidism and myxœdema as belonging to the same disease, from analogy of clinical symptoms of those possessing adenoids and of the weak-minded myxomatous, the presence of adenoids in the latter, and the great frequency of adenoid vegetations where cretinism is endemic.

GRADENIGO.

351. A farmer, thirty years of age, had his nose completely filled with grayish-red, soft, bleeding polypi. The buccal and pharyngeal cavities were occupied by a hard, fleshy mass starting from the base of the sphenoid. The tumor on examination proved to be a soft angio-fibroma. The growth was removed by electrolysis in a course of treatment lasting seventy-three days. No relapse after eight months. SACHER.

352. A man, now aged twenty-eight, had a fibrous tumor of the naso-pharynx as a boy of thirteen years. INGALS had then removed the tumor except some part attached to the vertical plate of the palate bone. It began afresh to crowd out beneath the zygomatic arch. An attempt at radical removal through an outer incision in the cheek from mouth to ear had to be abandoned owing to profuse hemorrhage. The growth then continued to grow for about a year, completely closing the right nasal cavity and destroying the sight of the right eye. The tumor then remained stationary for many months, but the patient began in a couple of months to breathe a little through the nose. From now on he steadily improved, until after several years the nasal cavity ap-

peared perfectly free and the right cheek had grown smaller. The right eye appears normal, but is blind. The fibrous growth has disappeared. The right nasal cavity is an inch wide, the septum is pushed aside, and the turbinates are destroyed. There is a large opening in the sphenoid cells. M. TOEPLITZ.

SOFT PALATE, PHARYNX, AND BUCCAL CAVITY.

352 *a*. COUVELAIRE and CROUZON. Movements of the soft palate. Transactions of the Biological Society. *Le progrès médical*, Dec. 2, 1899.

353. MASINI, G. Have the tonsils an internal secretion? *Ann. des mal. de l'or., du lar.*, No. 7, 1899.

354. MAMLOK. A case of primary malignant lymphoma of the tonsil. *Arch. f. Laryng.*, vol. ix.

355. LJANZ. The treatment of mercurial stomatitis. *Medicinskoje Obosrenje*, Jan., 1899.

356. GOLDSCHMIDT. The smooth atrophy of the root of the tongue in tertiary syphilis. *Berl. klin. Wochenschr.*, No. 43, 1899.

357. L. A. The treatment of angina and diphtheria in Cælius Aurelianus. *Münch. med. Wochenschr.*, No. 47, 1899.

358. SIEGERT. On an epidemic of lacunar angina and its period of incubation. *Münch. med. Wochenschr.*, No. 47, 1899.

359. MAYER, EMIL. The tonsils as portals of infection. *Four. Am. Med. Assoc.*, Dec. 28, 1899.

360. GOODALE, J. L. Acute suppurative processes in the faucial tonsils. *N. Y. Med. Four.*, Oct. 7, 1899.

361. LELAND, GEO. A. Tonsillar and circumtonsillar abscess. *N. Y. Med. Four.*, Oct. 7, 1899.

362. HUBBARD, THOMAS. Peritonsillar abscess associated with diphtheria. *N. Y. Med. Four.*, Oct. 14, 1899.

363. WARD, M. R. Septic thrombo-phlebitis as a complication of peritonsillar abscess. *N. Y. Med. Four.*, Oct. 14, 1899.

364. WATSON, ARTHUR W. Accessory thyroid gland at the base of the tongue. *N. Y. Med. Four.*, Oct. 21, 1899.

365. INGALS, E. FLETCHER. Fibro-lipomatous tumor of the epiglottis and pharynx. *N. Y. Med. Four.*, Dec. 9, 1899.

366. McREYNOLDS, JOHN. Chronic recurring membranous pharyngitis. *Four. Am. Med. Assoc.*, Dec. 2, 1899.

367. GAGE, GEO. C. Some of the dangers of acute pharyngeal abscess obviated by the use of a new trocar. *N. Y. Med. Jour.*, Dec. 16, 1899.

368. HOPKINS, F. E. Recurrence of the tonsil after excision. *N. Y. Med. Jour.*, Dec. 2, 1899.

369. MUSSON, EMMA E. Infective granulomata of the pharynx; glanders. *Four. Am. Med. Assoc.*, Nov. 25, 1899.

352 a. The movements of the soft palate were observed in a man with a large defect in the orbital and nasal regions following an operation for carcinoma. 1. During inspiration with closed mouth the velum is slightly raised. 2. The palate also moves conjointly with the pharyngeal wall, whereby the naso-pharynx is shut off. This consists of (a) a raising of the soft palate to not quite the horizontal, or beyond the horizontal (incomplete or complete closure); (b) an advancing of the posterior pharyngeal wall which approaches the soft palate; the posterior median line and the upper wall of the pharynx remain immovable; (c) a protrusion of the salpingo-pharyngeal plica, forming upper and posterior supporting columns for the velum. The closure of the naso-pharynx is complete during swallowing, sucking, expiratory pressure in blowing and whistling; an incomplete closure takes place during coughing. During phonation, the degree of closure varies: (a) in pronouncing vowels, the closure increases from *a* to *e*, from *e* to *o* and to *a*, and from *u* to *i*; (b) in pronouncing the consonants, the closure varies according to the accompanying vowels; (c) for the consonants *m* and *n* the closure is very incomplete.

SCHWENDT.

353. The tonsils of dogs and calves were removed and extracts made with water or glycerine which was injected into the auricular vein of the rabbit. The exposed heart and the femoral vein then showed for some time a distinct slowing and strengthening of the heart activity. This action did not take place when the tonsils had been chronically or congenitally hypertrophied. MASINI regards the tonsils as internal secreting organs.

ZIMMERMANN.

354. A very careful analysis of a typical case of this rare condition.

ZARNIKO.

355. LJANZ discusses the prevention of mercurial stomatitis and speaks of a number of tooth pastes and soaps. The best remedy for stomatitis is hydrogen peroxide (8-10 per cent); it is non-toxic, non-irritating, and very germicidal. The author

prescribes a 2 per cent. gargle. In large and many ulcers he employs iodoform in powder or ethereal solution. SACHER.

356. After an examination of two hundred cases of syphilis, GOLDSCHMIDT concludes that the smooth atrophy of the base of the tongue is not clinically a pathognomonic sign of tertiary syphilis, as it may be present in other conditions, either combined with a poor development of the tongue in general or when the rest of the tongue is well developed. MÖLLER.

357. An interesting historical paper by an anonymous writer. AURELIANUS possessed a long list of therapeutic measures, including intubation, of which he personally was not in favor. SCHEIBE.

358. The period of incubation is four days. The patient should be isolated, and the brothers and sisters should not be allowed to attend school until the fifth day has passed without infection. SCHEIBE.

359. After an elaborate review of the published cases, in which an angina was followed by articular rheumatism, severe general infections, metastatic abscesses, angina pectoris, broncho-pneumonia, and other affections, MAYER narrates a case of his own observation in a young man æt. nineteen, who twenty-four days after an attack of acute follicular tonsillitis was seized with syncope and vomiting. After the endocarditic murmur had become fainter, symptoms of hemichorea of the right side, and finally also of the laryngeal muscles, developed, from which the patient completely recovered. M. TOEPLITZ.

360. Eight cases of acute amygdalitis with intrafollicular foci of suppuration showed: 1, the streptococcus more abundant than the staphylococcus, where the foci were numerous; 2, the foci in two cases *with*, in six cases *without* circumtonsillar inflammation; 3, the foci clinically to represent a severe infection; 4, no clinical signs by which the abscesses could be diagnosticated; 5, histologically: *a*, the foci to vary in size, number, and location; *b*, the fibrinous exudate in the crypts quite marked; *c*, in the cases with peritonsillar abscess, the connective-tissue spaces crowded with polynuclear neutrophiles. The conclusion may hypothetically be arrived at, that the pyogenic infection of the follicles is secondary to a previous infection of the crypts by the staphylococcus pyogenes. M. TOEPLITZ.

361. LELAND used for opening tonsillar and circumtonsillar abscesses the sickle knife, cutting lengthwise through the tonsil,

and introduces his sterilized index finger into the incision, thereby breaking up the diseased tissue in and around the tonsil. The abscess is thus found much quicker than by other methods, and the duration of the affection is much shortened, as is well illustrated by the reported cases. In some instances the deep-seated abscess had to be opened on the following day with the probe-pointed knife.

M. TOEPLITZ.

362. Case 1 : a farmer, æt. thirty, had, after an acute amygdalitis, his right tonsil incised and pus evacuated. The next day both tonsils and pharynx were found to be covered with false membranes. Thirty-five hundred units of antitoxine did not prevent the membranes from invading the naso-pharynx, nares, and larynx. On the sixth day laryngeal stridor and extreme dyspnoea, purulent discharge from the throat, and ichorous flow from the nares ensued, associated with extreme swelling of the anterior cervical region suggestive of phlegmon. Tracheotomy was performed. The patient died after eighteen hours. The wife and two children also had diphtheria, but recovered. Case 2 : the eldest son of a large family had sore throat, two young children mild amygdalitis, a younger daughter typical diphtheria; another had quinsy. About four days later the one was moribund from diphtheritic toxæmia and the other had a large peritonsillar abscess with pseudo-membrane. The abscess was incised and much pus evacuated.

M. TOEPLITZ.

363. WARD adds to three cases collected from literature two of his own observation. Case 1 : a woman, æt. thirty, felt at first pain in the left tonsil, and after three days presented a swelling of the right tonsil and marked tumefaction of the right side of the neck with chilly sensation. The tumefaction extended from the angle of the jaw down to the clavicle. Then pain in the right side of the chest, cough, expectoration tinged with blood, diarrhoea, vomiting, enlargement of spleen, and severe chills appeared. Incisions of the tumefaction and tonsils evacuated pus. Death ensued on the ninth day. The autopsy revealed thrombosis and thrombo-phlebitis of the internal jugular and the veins leading upward to the tonsillar plexus, a metastatic abscess in the middle lobe of the right lung, other foci in the apex and base, and great enlargement of the spleen. Case 2 : a man, æt. forty-two, had, after opening of a left peritonsillar abscess, increased swelling of the left tonsillar region and the tissues of the neck resembling a cellulitis. Death followed soon. The autopsy showed a thrombo-

sis and thrombo-phlebitis of the internal jugular and multiple small abscesses of the kidneys. M. TOEPLITZ.

364. WATSON reports two cases of accessory thyroid glands at the base of the tongue. The first occurred in a woman, aged fifty, and occupied the lingual base from the epiglottis to the papillæ circumvallatæ, being an inch and a half long, an inch wide, and an inch thick; the second case was seen in a colored girl, æt. sixteen, who had felt the lumps for five years in her throat. It looked like the first case except for its ulceration. The diagnosis was made in both cases by the microscope.

M. TOEPLITZ.

365. INGALS'S patient, æt. twenty-eight, had difficulty in speaking, swallowing, and breathing, particularly in a recumbent posture. A smooth tumor filled the laryngo-pharynx, leaving only a small chink about a quarter of an inch wide at the left side. Stout steel wire, passed through a uterine ecraseur, succeeded in cutting it off in four pieces of $1\frac{1}{2} : 1$, $\frac{1}{2} : \frac{1}{3}$, $1\frac{1}{4} : \frac{1}{2}$ and $\frac{1}{2}$ inches respectively. The tumor had been attached to the upper portion of the right side of the epiglottis, to the right pharyngo-epiglottic fold, to a part of the base of the tongue, and to the right side of the pharynx. The first removed mass was a typical fibroma, another a fibro-lipoma, and the last large mass a lipoma. The right side of the epiglottis became adherent to the pharynx and to the base of the tongue without preventing deglutition.

M. TOEPLITZ.

366. The patient, a female, æt. nineteen, presented a membrane remaining one or two days when it spontaneously disappears, leaving the throat in apparently healthy condition, always covering the soft palate, sometimes also the centre pharynx, being pearly-white, with pin-hole perforations, recurring two or three times a week when not treated. It contained no diphtheria bacilli and no fungi.

M. TOEPLITZ.

367. The point of the trocar is cone-shaped and a guard ferule is placed half an inch from the point. The curve of the trocar adapts itself to the shape of the tongue. A Y-shaped tube is connected with the trocar through one limb, the other ending in a rubber bulb, while to the stem a glass bulb is attached, which also ends in a rubber tube closed with a clamp. If the flow of the pus is too thick, the clamp is closed and the rubber bulb when squeezed produces suction. If the flow is thin, the trocar can be used without the tubing.

M. TOEPLITZ.

368. HOPKINS adds to one case of his own observation occurring in a girl *æt.* thirteen, in whom one tonsil had recurred four months after excision, the views of many authors widely differing as to the cause and frequency of recurrence, the smallest number being observed by laryngologists. M. TOEPLITZ.

369. A woman, *æt.* fifty-six, presented rapid enlargement of the tonsils; she lost flesh, but had extreme fulness of the neck, beginning at each side of the angle of the jaw, giving it a pouched appearance. Apart from the large tonsillar masses, a soft growth of the size of a black walnut filled the left half of the naso-pharynx, and lingual masses were seen in the glosso-epiglottic space. Removed portion of the left soft and friable tonsil was supposed to be a sarcoma. After radical removal of the masses improvement took place. In April, 1895, a year and a half after the operation, the lingual masses had increased, the faucial ones had also returned, and the vault had filled up again, also on the right side. In December, 1895, the diagnosis of glanders was made with the microscope. On March 17, 1896, the fauces and naso-pharynx were thoroughly cleared from the masses, whereupon the patient improved. Inoculations of six guinea-pigs produced orchitis and intestinal lesions covered with bacilli mallei. On March 27, 1896, intestinal disorders took place. The pharynx appeared well in June, but the patient died in September. No autopsy was held. M. TOEPLITZ.

BOOK REVIEWS.

VII. Leçons sur les suppurations de l'oreille moyenne et des cavités accessoires des fosses nasales et leurs complications intra crâniennes. By Dr. HENRY LUC, ancien interne des hôpitaux de Paris. Octavo-volume of 500 pages, with 28 figures in the text. Paris : J.-B. Baillière et fils, 1900.

The author publishes, in 26 leçons, the lectures he delivered at his clinique in Paris.

The first lecture gives a general view of the topography of the accessory cavities, their connections with the nasopharynx, and their contiguity to the cranial cavity to which their suppurations frequently extend. He mentions the unique case of Westermayer, where even an empyema of the maxillary antrum, the latter alone being at some distance from the skull, after perforation of the upper posterior wall entered the skull through the upper part of the pterygo-maxillary fossa. He speaks of the transmission of the infection from one sinus to the other, of the lining membranes, the pyogenic microbes, and the diagnosis of the empyemas where the old objective signs (swelling, redness of the integument, pressure sensibility, escape of pus) had been essentially supplemented by the electric illumination through mouth, nose, and upper-inner corner of the orbit.

The *next two* lectures are devoted to *acute middle-ear suppuration*, of which the author gives an excellent description. We mention some points. He says: "I cannot well imagine that an acute suppurative otitis exists without a certain degree of concomitant antritis, but we should not speak of mastoiditis before the suppuration has spread into the mastoid *cells*" (p. 16). He emphasizes the grave signs otitis produces in small children, which fact, "perhaps, is explained by the more intimate circulatory connection between the ear and brain in the child" (p. 20). As to the terminations, he distinguishes six kinds: recovery; re-

covery with diminution of hearing ; recovery with persistent perforation of the drum membrane ; with mastoid complication ; with intracranial infection ; transition into the chronic state (p. 25).

The variations of this, the typical clinical picture, may be designated by prominent symptoms, and their etiology, as the *grippe form*, by its tendency to mastoid and intracranial complications ; the acute *necrosing* form in the infectious diseases, scarlet fever, diphtheria, typhoid fever, measles ; further, the peculiar course when *erysipelas* develops in an ear with ordinary otitis purulenta, during the regular course of which at once are noticed long and marked chills, temperature 105° F., later falling to the normal, these attacks repeating themselves for the next days, until the characteristic elevated border of the erysipelas ambulans shows that pyæmia is not the cause of these rapid changes. *Tuberculosis* (lack of pain), *sypphilis* (inordinate degree of deafness by labyrinth complications), and *diabetes* (tendency to extensive destruction of bone in mastoid and surroundings) are discussed.

The treatment does not contain anything new. Early large paracentesis, removal of the pus by inflation (catheter or Politzer), drainage by the introduction of thin, round, long wicks of absorbent cotton or gauze, touching or even a little entering the perforation in the drum-head (Loewe). The wound should be dressed or cleansed at least once daily, the ear inflated, the meatus mopped out with absorbent cotton, then a few drops of carbolic acid 1 part, to glycerine 15 parts, instilled, and a drainage wick of gauze introduced again. The glycerine-carbolic-acid wash acting as an antiseptic and analgesic, favors the escape of the secretion by mixing with and diluting the pus. When the period of pain is over, this treatment is replaced by peroxide of hydrogen and insufflation of boric acid powder. The cleansing with a syringe is to be substituted for the above dressing, if the patient cannot be dressed by the physician every day. He recommends caution in its use. We would say that the chief remedy in a case of acute otitis media is *rest in bed*. This disease is important and requires care and nursing. Forcible inflation of the ear before or after the paracentesis should be omitted, just as injections, for we have seen aggravation of the disease follow their use immediately. The inflations are proper when the active inflammation is passed. We have no experience with the carbolic-acid glycerine drops ; we depend chiefly on paracentesis, dry

treatment, rest in bed, and patience until the full recovery is obtained, for relapses and dangerous complications are rife.

The next subject which the author takes up and describes in full detail is *acute* and *chronic mastoiditis* (55 pages). He emphasizes the variations of the structure of the mastoid as determining to a great degree the clinical picture. The etiology, symptomatology, and treatment are well presented, particularly the opening of the mastoid. He devotes a full lecture to the Bezold mastoiditis, which the peculiar features and the gravity of this variety fully deserve.

Lectures VII.-X. treat of chronic suppurative middle-ear inflammation (70 pages). The first lecture consists in general remarks on the disease, its causes, otoscopic condition (perforations of membr. tymp., small or large, the importance of their location, the aspect of the "fundus of the ear," the mucous membrane, congestive swelling, thickening, fungosities, granulations, and polypi, and their histology), epidermization, cicatrices, changes in the ossicles, etc. In the symptomatology he describes also the manner of examining the ear, its cleansing (Hartmann's tympanum syringe), and the significance of the substances which are removed, for instance those from the attic by the variable prognosis of facial paralysis and the acuteness of hearing, and the value of the exploration with the straight and bent probes. To judge how much importance as to prognosis and indications is to be laid on the different conditions found by a thorough examination, he describes them in five progressive types.

Lecture X., the suppuration of "Shrapnell's cavity." The author describes the attic, adopting the views of Schmiegelow as published in the *Zeitschrift für Ohrhe.*, 1891, and the English edition, these ARCHIVES, xx., p. 228-256. The various important conditions, caries, necrosis, granulations, polypi, and cholesteatoma, found in this small and intricate cavity are well set forth, and their treatment, up to ossiculectomy and removal of all carious and necrosed portions of the osseous walls, is dwelt upon.

The next three lectures are devoted to the consideration of *chronic mastoiditis*, 36 pages. The cases known as latent mastoiditis (no fistula, etc.) require careful examination of the tympanic cavity and its recesses, and judicious appreciation of the subjective and objective symptoms in the course of the affection, facial paralysis, etc. Deep, intense, constant pain, varying in intensity, and mostly pressure sensibility in a particular point,

mostly at the base, are the only signs preliminary to an intracranial complication.

The so-called radical operation, the opening of all the cavities of the ear, is described ; first Stacke's, then Zaufal's method. The descriptions are very clear, and the propositions well considered.

Cholesteatoma occupies a full lecture. The diversity of opinion on this remarkable formation is set forth at great length. The subject is practically very important.

Lectures XIV.-XIX. treat of the empyemas of the accessory sinuses (141 pages).

The maxillary sinus receives 47 pages ; the descriptions are very elaborate. He says an exact diagnosis begins with the cultivation of rhinology in modern times. The sign of Heryng (of Warsaw), shown first at the congress of Paris in 1889, namely, the transillumination,¹ has assisted materially in the diagnosis of all the cases. It has been extended by Vohsen, Davidson, and others.

He describes in full detail, and with a certain degree of enthusiasm, his way of curing chronic maxillary empyema ; he calls it *La méthode opératoire Caldwell-Luc*, because Dr. Geo. W. Caldwell, of New York, has published essentially the same operation before him (*New York Med. Jour.*, Nov. 4, 1893), of which the author heard only a year ago. The technique is as follows : 1. Incision of the mucous membrane of the mouth in the canine fossa in a horizontal line. 2. Chiselling through the bone horizontally at the level of the molar teeth as far as the angle between the lower and nasal walls. 3. Cleaning out the sinus with bent spoons. 4. Formation of an artificial hiatus in the nasal wall. 5. Establishing drainage into the nose. 6. Suturing the wound in the mouth. He has done this operation many times, and his colleagues in Paris have adopted it. The results have been rapid and permanent, exceedingly satisfactory recoveries. We cannot enter into further details, but have received the best impression from reading the description of the method and the accounts of recovery given by the author.

The *frontal-sinus* empyema is discussed at length, its simultaneous existence with ethmoidal and maxillary empyemas is emphasized, and, in chronic cases, the operation by removal of the anterior osseous wall recommended. He considers critically the

¹ We leave the French word "transillumination" (*Durchleuchtung* in German), which is, perhaps, as good or better than the customary word, "transillumination," of English writers.

different methods. In rebellious cases, he says, a German surgeon, G. Düntz,¹ has proposed the total resection of the anterior wall. The author might have mentioned the osteoplastic operation of Czerny (Heidelberg) and Golovin (Moscow), and the bold and very excellent method of Jansen (Berlin). Jansen detaches the skin and periosteum along the inner corner and upper margin of the eyelid, together with the uncut pulley of the tendon of the superior oblique muscle of the eye, removes the lower bony wall of the sinus and all diseased bone, not only in the walls of the frontal sinus, but of the adjacent ethmoidal cells. The reviewer has seen the most surprisingly good results of this operation done in New York, and has adopted it himself.

The reviewer, greatly interested in Dr. Luc's monograph, has given his pen more scope than is usual in book reviews. He has to be brief with the remainder of the work. The empyemas of the ethmoidal and sphenoidal sinuses are described with the same care and judgment as the preceding subjects, which shows that the author is less of an "*autodidacte*" than he alleges to be in the preface of his book. He shows that he is fairly familiar with the literature of his subject, in particular the German, less perhaps than he should be with the English, but he is fully at home among the host of important diseases which form the subject-matter of his lectures. This can particularly be said of the last part of the work: the intracranial complications of the suppurative diseases of the middle ear and the accessory cavities of the nose.

The subjects of the remaining seven lectures are as follows: Mechanism and propagation of intracranial infection. Extradural abscess. Sinus thrombosis. Pyæmia without sinus-thrombosis. Brain abscess. Leptomeningitis. Further, a supplementary lecture on the ophthalmoscopic diagnosis of the cerebral complications of the sinusites, by Dr. Valude, of Paris.

The presentation of this last part of the book is in keeping with the preceding. The style of the book is clear and easy. It will introduce the student thoroughly into this important and essentially modern branch of medicine and surgery, and delight the adept by walking pleasantly over a familiar field in which the author points out to him many view-points the beauty and significance of which he probably did not appreciate before. H. K.

¹ The reviewer does not know this name: perhaps it is a typographical error for Kuhnt, Professor of Ophthalmology in Königsberg, who published, about three years ago, an excellent monograph on *Frontal-Sinus Empyema*.

VIII. **A Treatise on Nasal Suppuration.** By Dr. L. GRÜNWALD (Munich). Translated from the second German edition by WILLIAM LAMB, M.D., etc., Birmingham. Published by William Wood & Co., New York. Pp. 335. Price, \$3.

The importance of affections of the accessory sinuses has of late years been more and more appreciated. The knowledge of this chapter of rhinology received its foundation by more exact and careful anatomical and pathological investigations. The clinical aspect has been furthered especially by Grünwald. *Die Naseneiterungen* of this author was the first—and until recently the only—book giving a detailed description of these affections. Its excellence and deserved popularity are well known. Its inaccessibility to those not conversant with German has now been removed by the appearance of Dr. Lamb's translation.

The localized or focal suppurations of the nose and its accessory cavities are treated in a general and in a special part. In the former, the etiology, morbid anatomy, symptomatology, methods of examination, therapeutics, and prognosis are discussed in general. In the second part, the suppurations are taken up separately, and the special features in each variety are dwelt upon. The subject-matter is illustrated by case histories from the author's practice, and frequently by a critical review of the cases published by others bearing on the subject in question. The methods of treatment are described in an especially lucid and practical manner. The relation of syphilis to nasal suppuration and a very brief chapter on tuberculosis are added in an appendix. A complete bibliography up to the year 1896 (the date of the last German edition) concludes the volume.

The work of the translator has been extremely well done. Dr. Grünwald's very vigorous and interesting style seems not to have lost force in the translation. As far as the book itself is concerned, it is excellently gotten up and quite surpasses the German original. We are sure that in its enlarged field of activity this book will continue to instruct, and stimulate investigation, in this very interesting field of nasal surgery. A. K.

APPOINTMENTS.

NEW YORK POLYCLINIC : Drs. Francis J. Quinlan and R. C. Myles have been elected Professors of Laryngology and Rhinology at the New York Polyclinic.

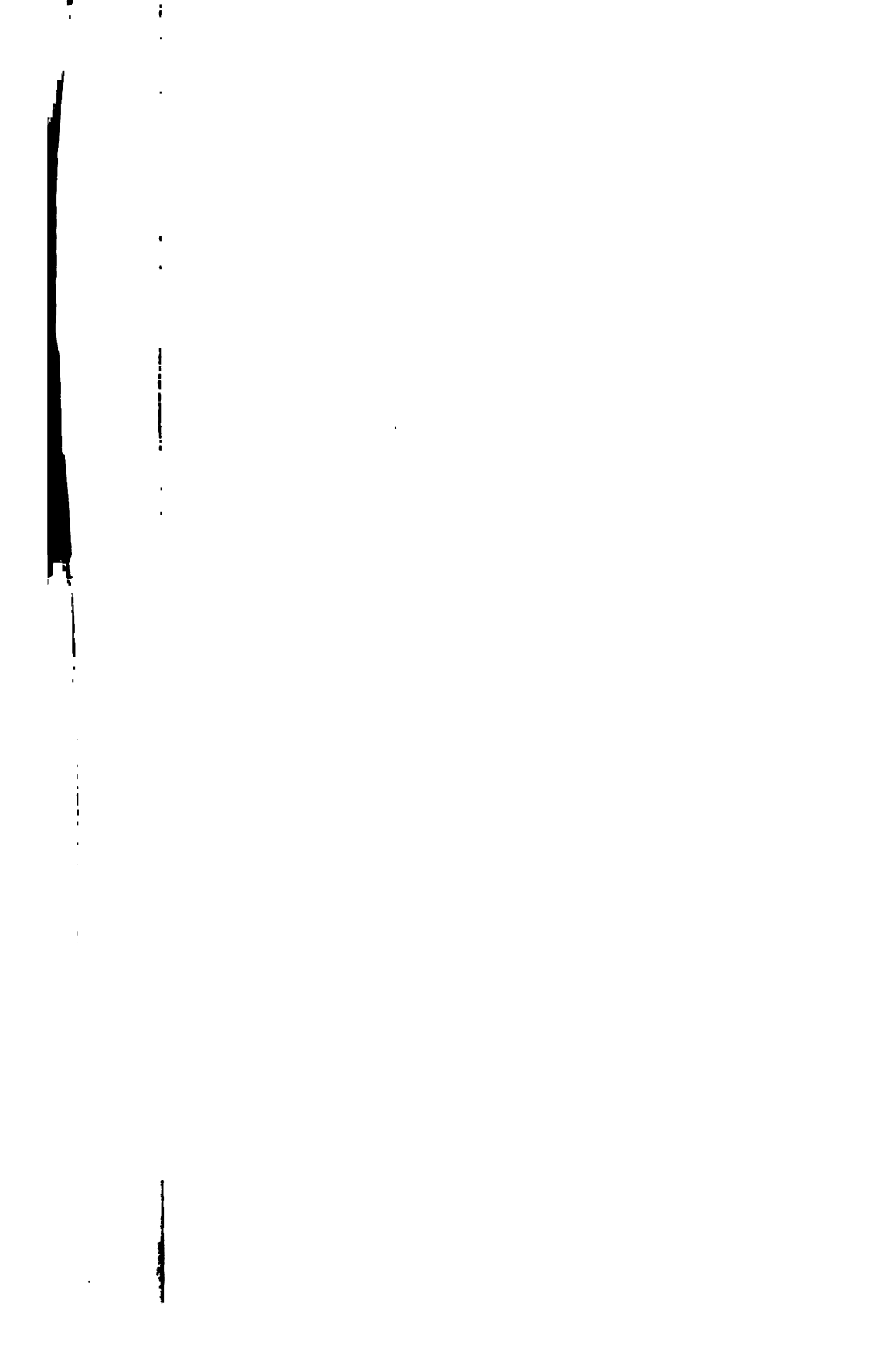
SOCIETY MEETINGS.

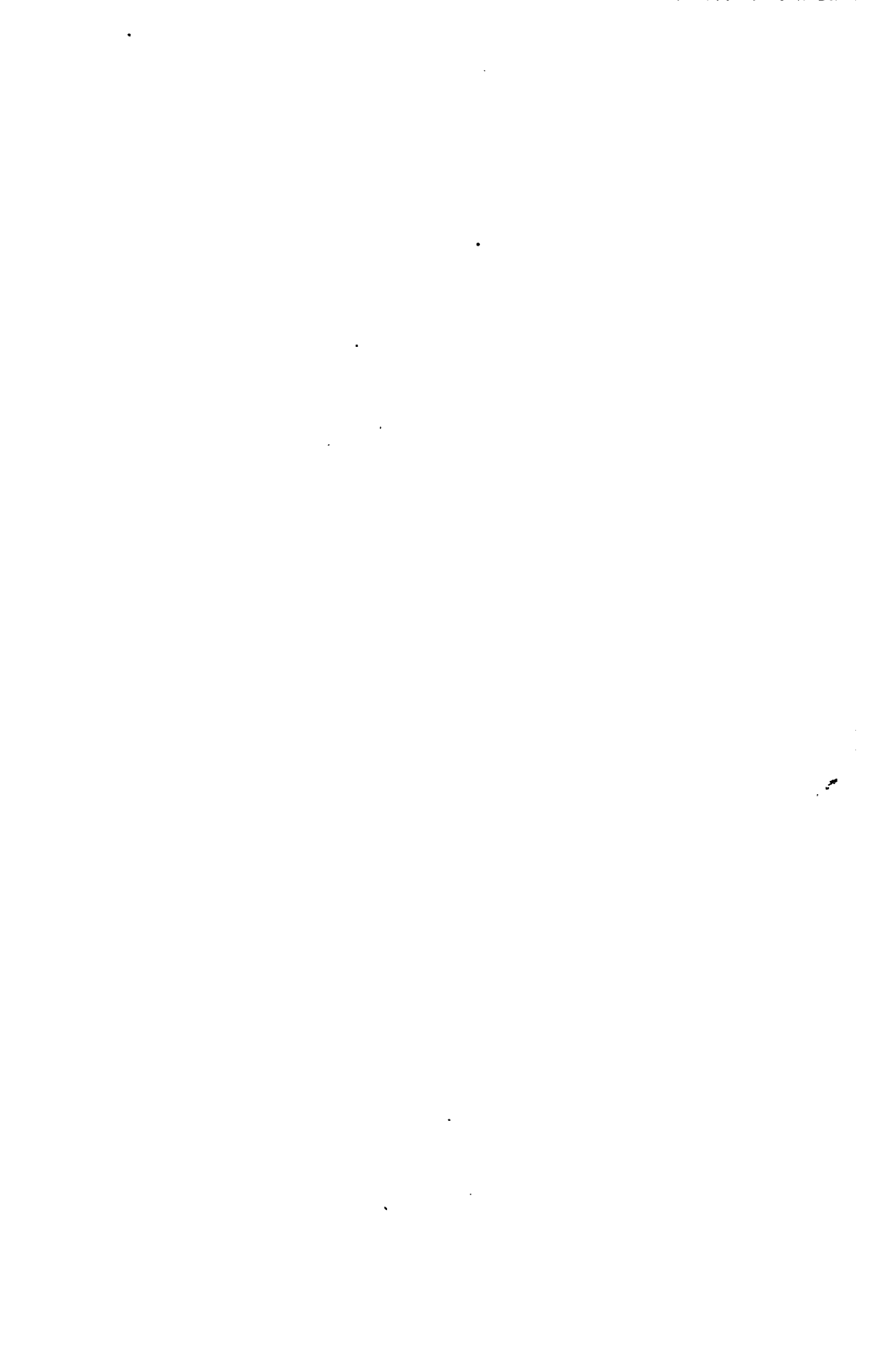
The Western Ophthalmological and Oto-Laryngological Society elected, at their last meeting, April 5-7, 1900, at St. Louis, Mo. : Dr. M. A. Goldstein, of St. Louis, President ; Dr. H. V. Wuerdemann, of Milwaukee, First Vice-President ; Dr. C. R. Holmes, of Cincinnati, Second Vice-President; Dr. Fayette C. Ewing, of St. Louis, Third Vice-President ; Dr. W. L. Ballenger, of 100 State Street, Chicago, Secretary. The place and time of the next meeting will be Cincinnati, O., April 11-12, 1901.

We are glad to publish the following notice in compliance with the request of the editors of the *Journal of Laryngology, Rhinology, and Otology* :

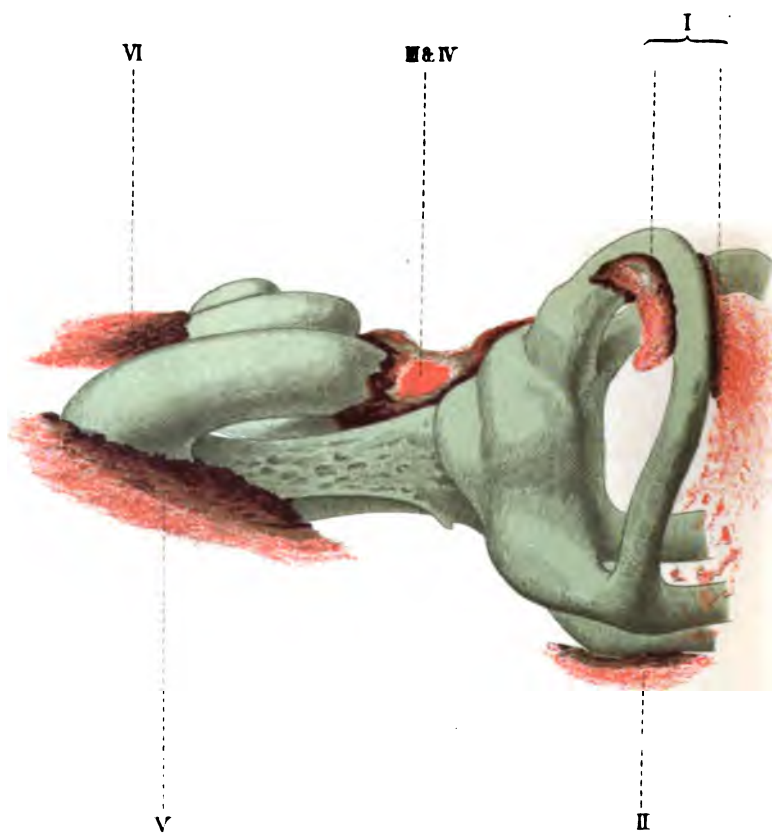
"An Appendix to the *International Directory of Laryngologists and Otologists*, compiled by Mr. Richard Lake, is in course of preparation. In it will be found corrections of names and addresses already given, an additional list of names and addresses received since publication, and an obituary list.

". . . Considerable additions have been obtained for the foreign list, which will materially add to its value and completeness. The decision of the editors of the *Journal of Laryngology, Rhinology, and Otology*, under whose auspices the Directory is published, to allow no name to be inserted in the British list for which sanction has not been given in writing, at once explains some omissions and criticisms. The editors, whilst desirous of making the Directory as complete as possible, consider it best to adhere to this course. It is therefore hoped that all engaged in the practice of Laryngology, Rhinology, and Otology will assist as far as possible in making this useful work complete," by sending in their names and addresses to the editor, *International Directory of Laryngologists and Otologists*, 129 Shaftesbury Avenue, W. C., London.

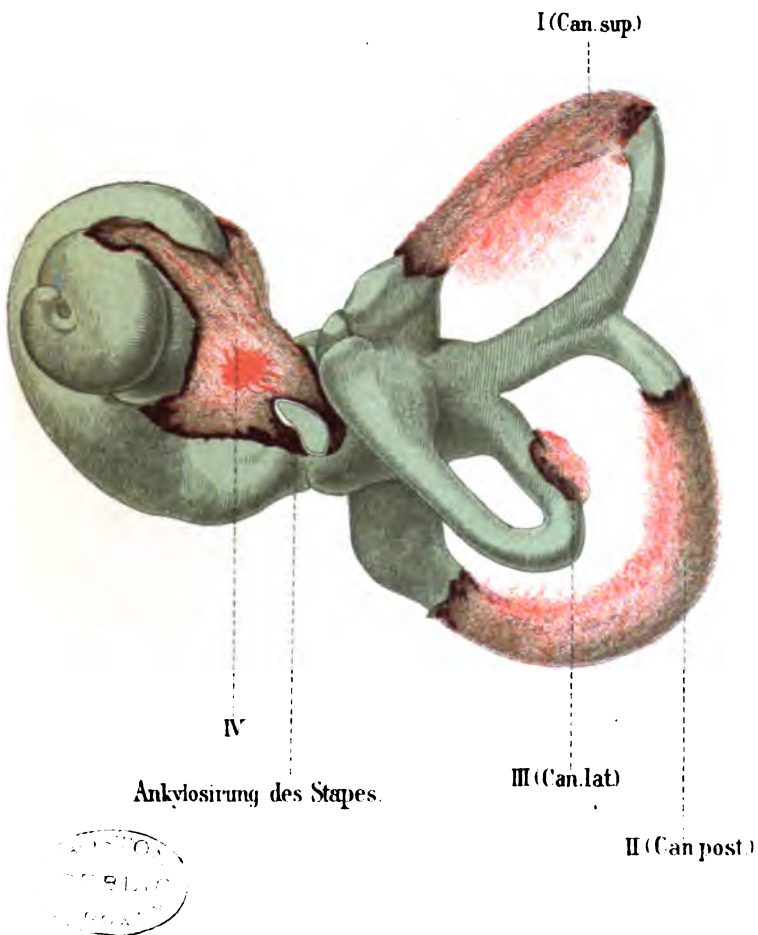


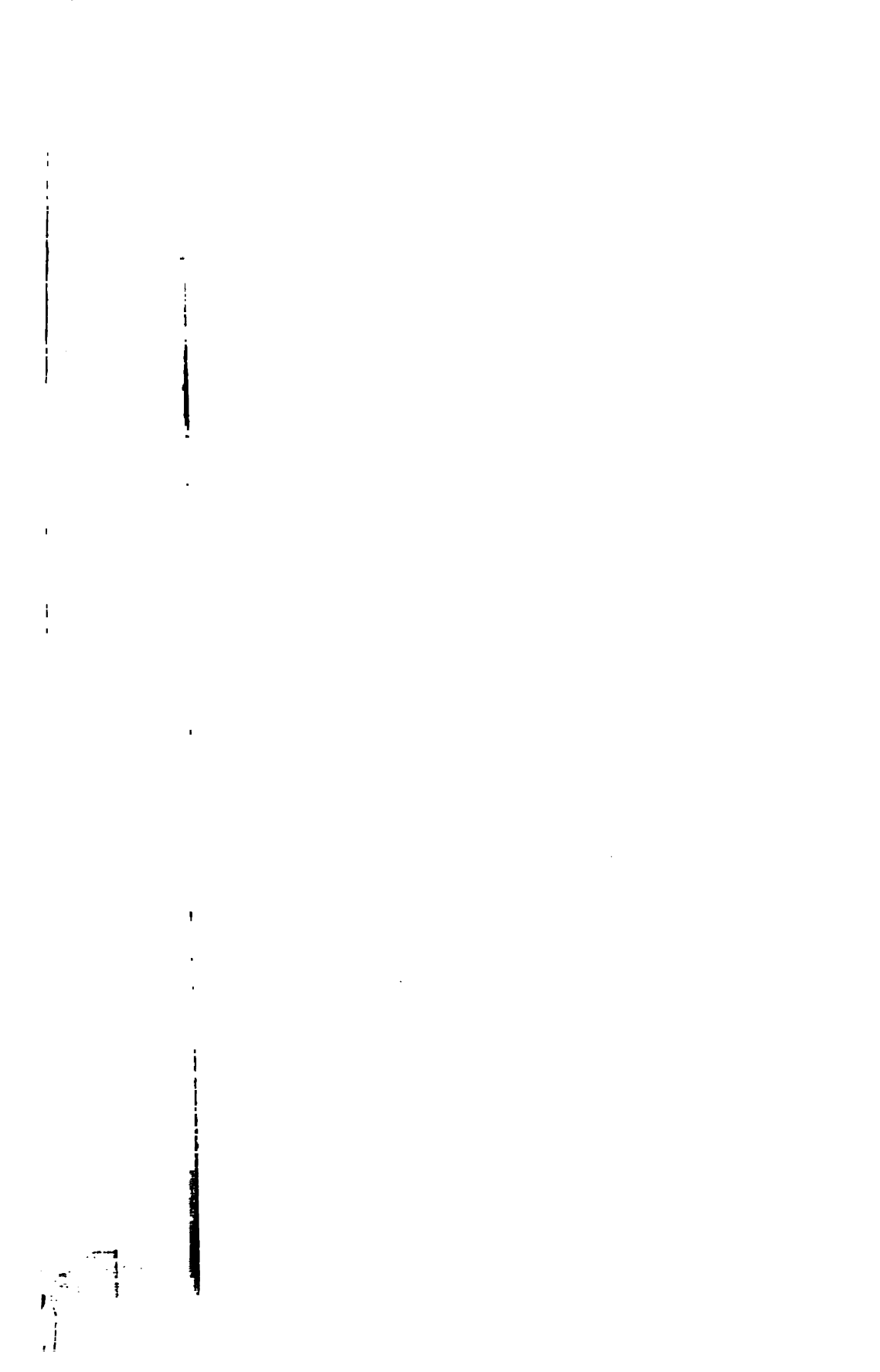


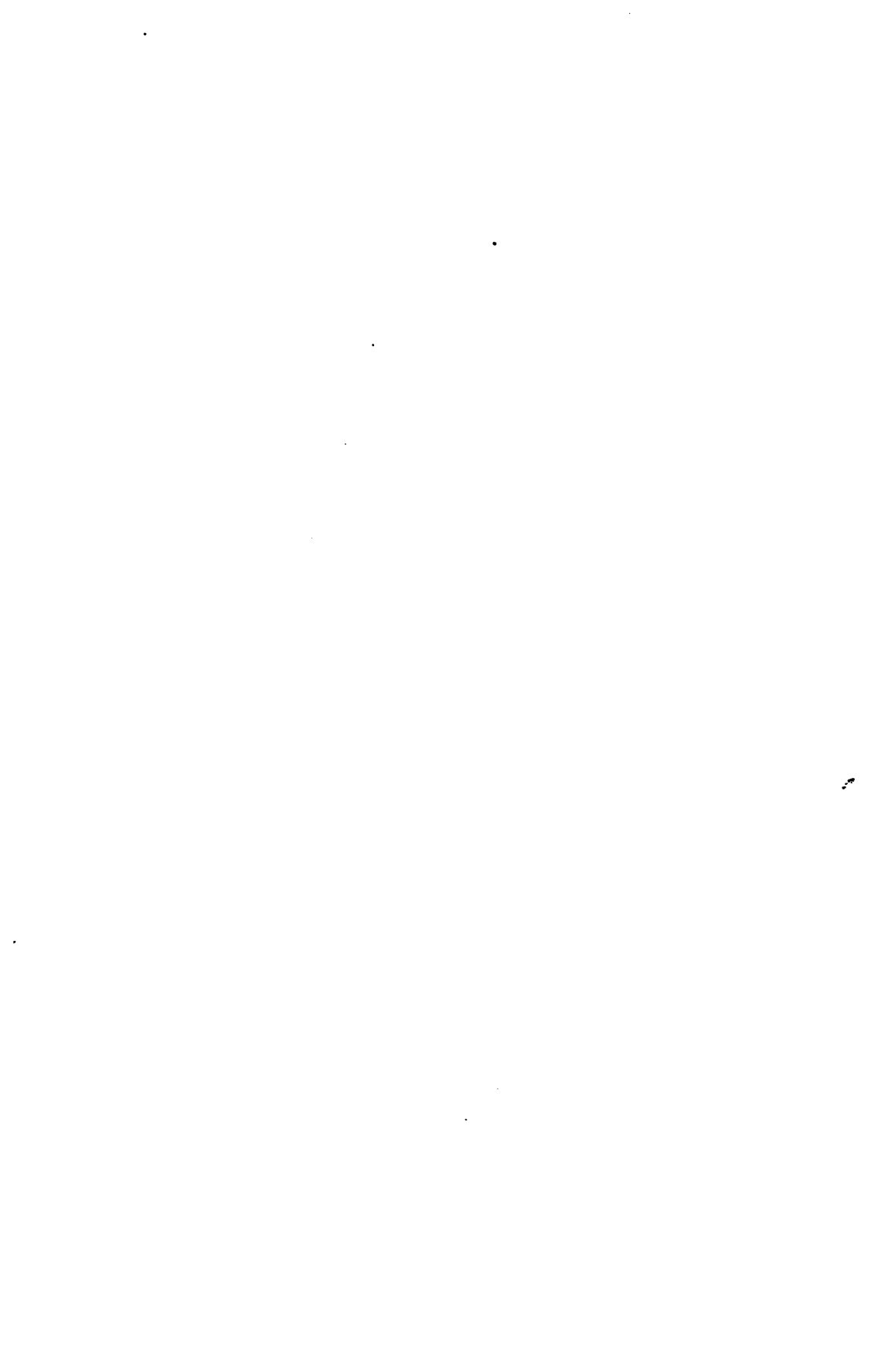
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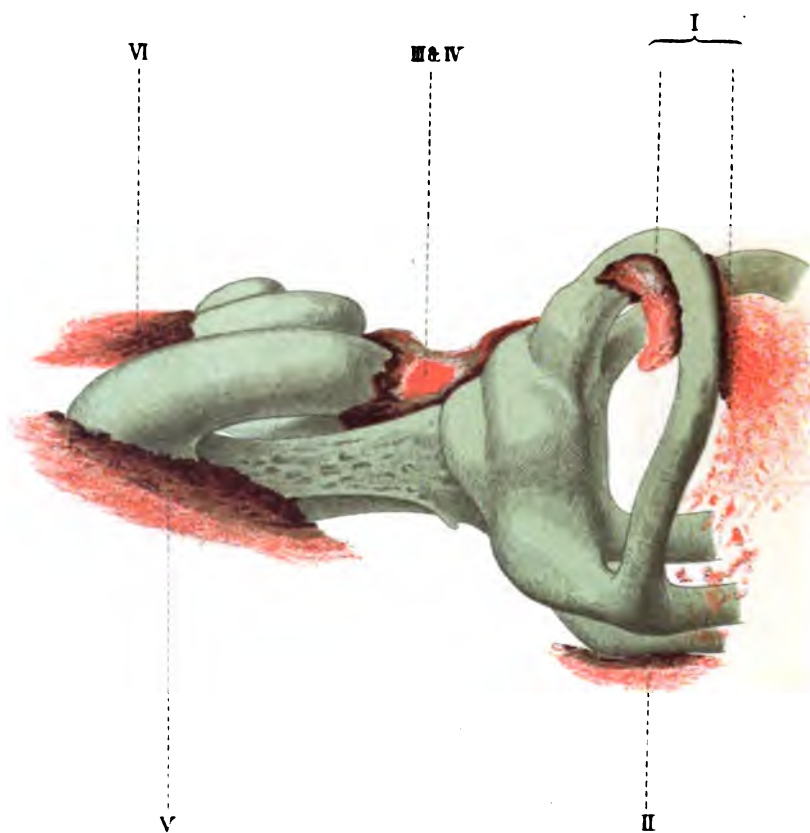
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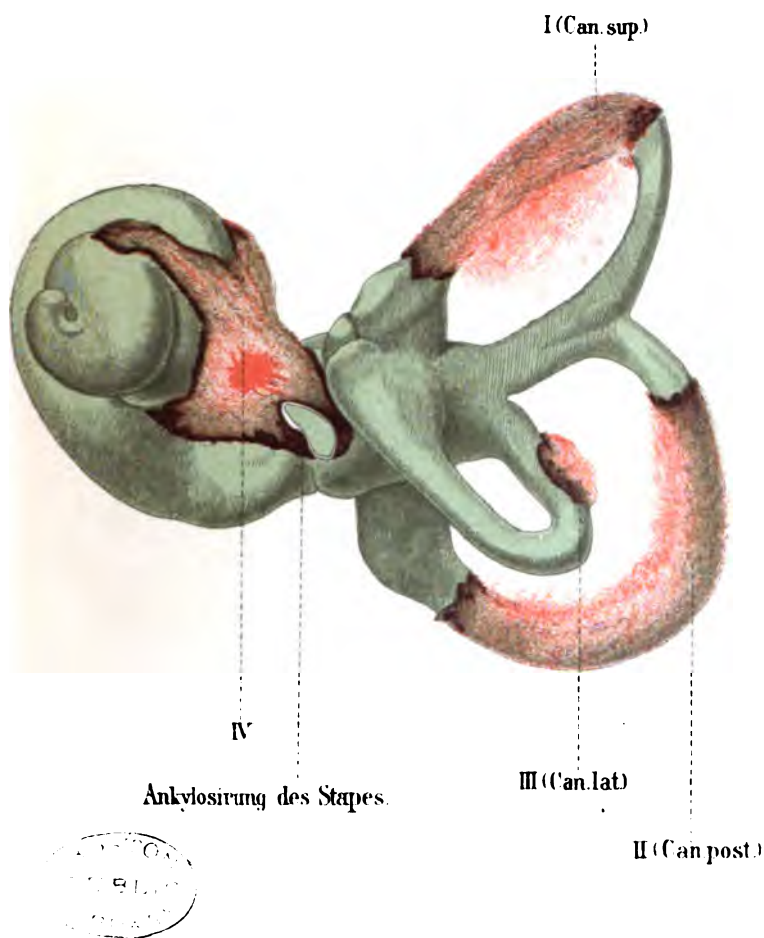


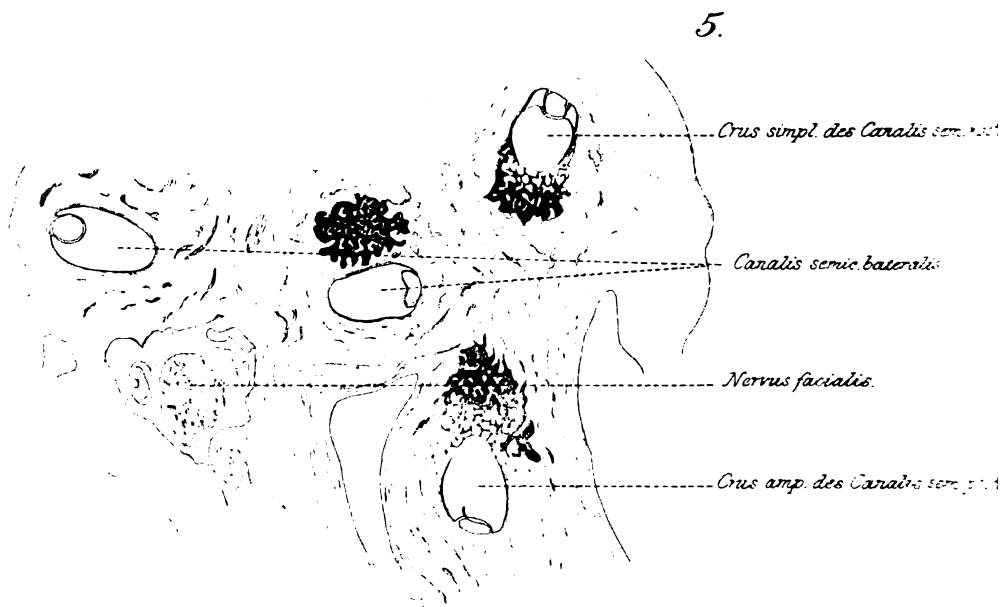
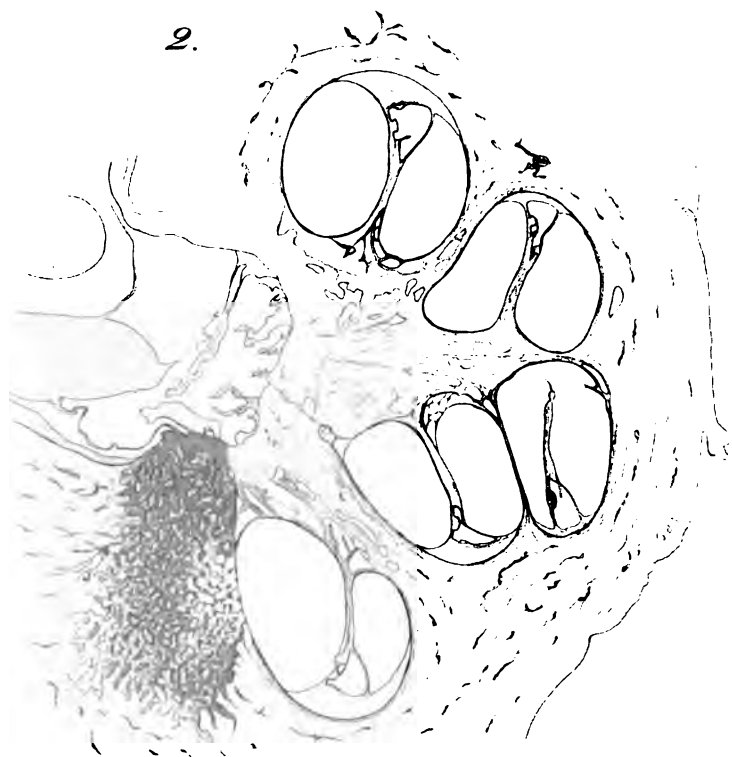


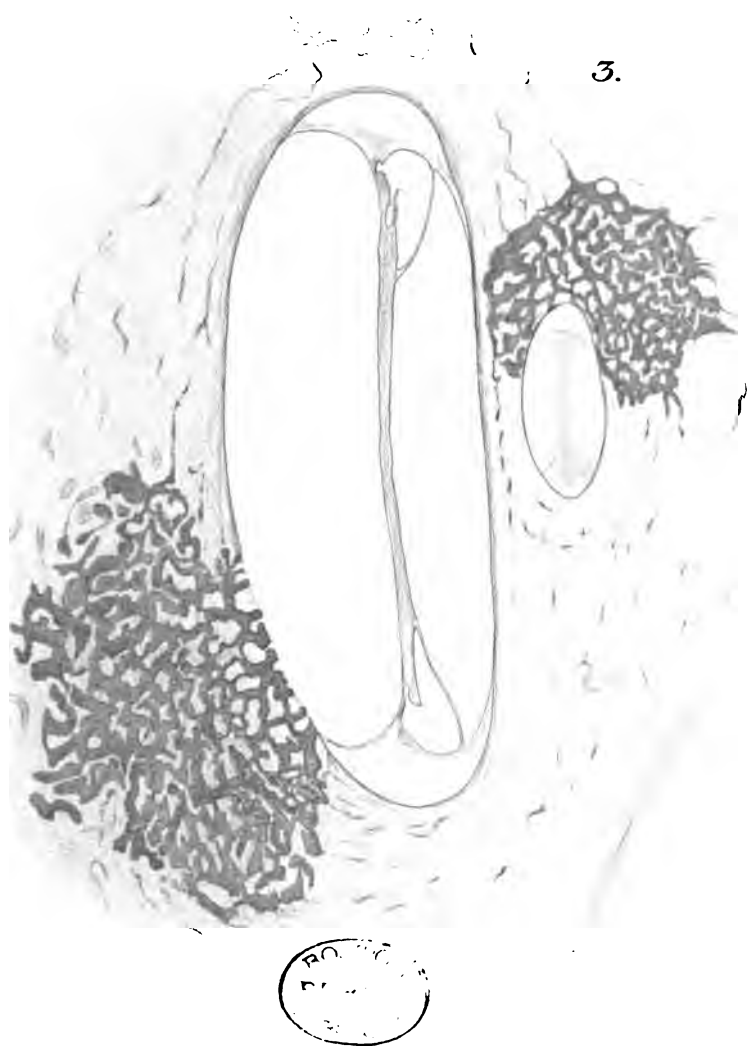
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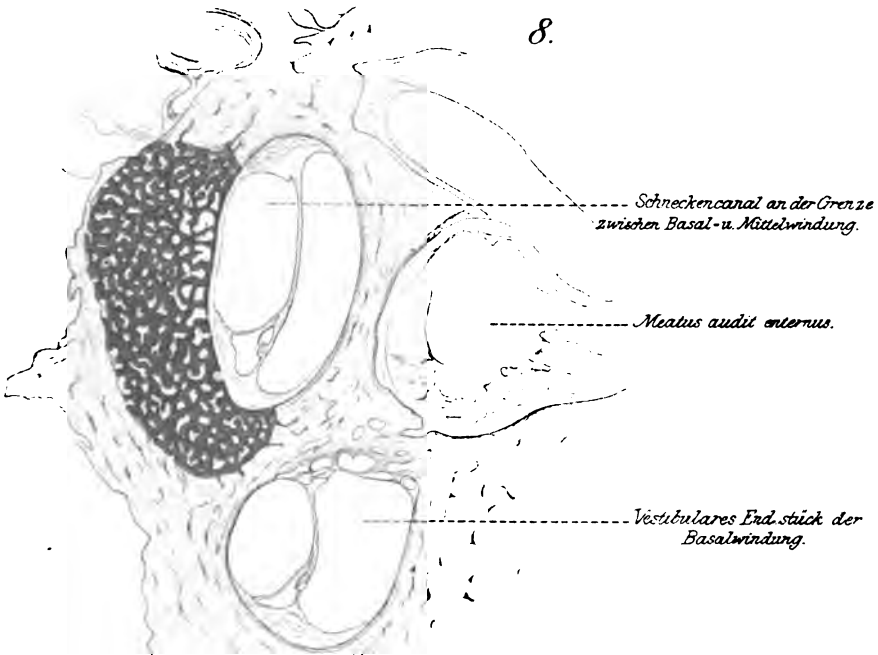
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triculo-ampullaris)

-----Macula utriculi

-----Oberer Umfang des ovalen Fensters
(spongiosirt u. wallartig nach dem Vestibulum zu verdickt)

-----Unterer Rand der Stapesplatte spongiosirt u. mit dem ebenfalls spongiosirten unteren Fensterrahmen knöchern ankylosirt.



-----Tympanum secundarium

EDITORIAL NOTICE.

The ARCHIVES OF OTOLOGY is a bi-monthly journal, published in annual volumes of about five hundred pages each, extensively illustrated with cuts in the text, half-tone text plates, and lithographic plates, many in colors.

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The papers and reports are original, and only accepted with the understanding that they are to be published in this journal exclusively. The original papers in the English edition appear in the German (*Archiv für Ohrenheilkunde*) either in full or in more or less abridged translations, and *vice versa*.

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LITERATURE ON APPLICATION.

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ARCHIVES OF OTOTOLOGY.

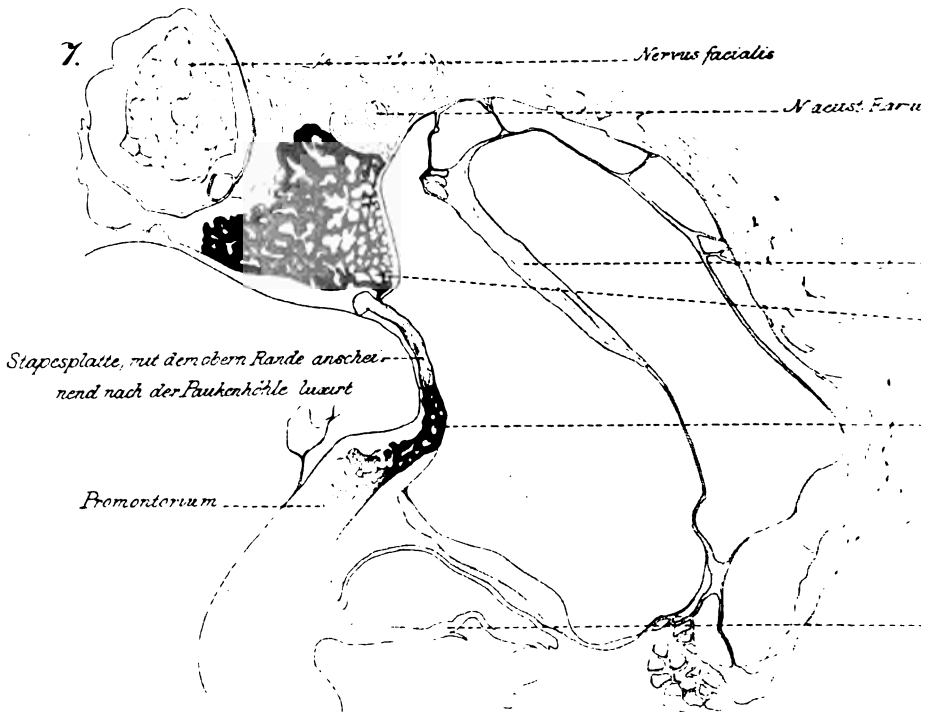
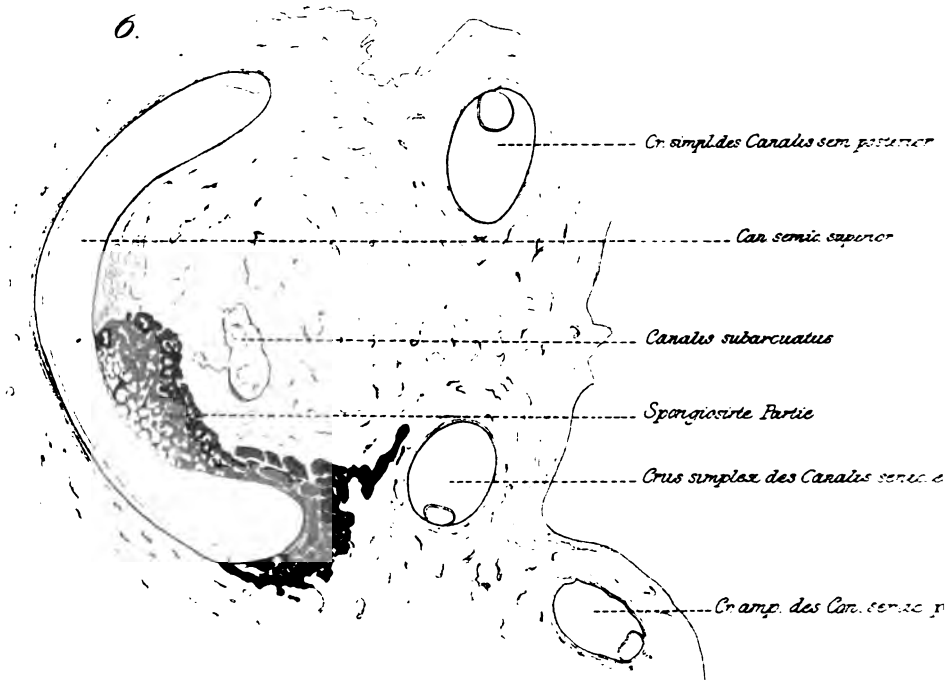
TWO CASES OF OTITIC LATERAL-SINUS DISEASE; OPERATIONS, WITH LIGATION OF THE JUGULAR.¹

BY DR. O. JOACHIM, NEW ORLEANS, LA.

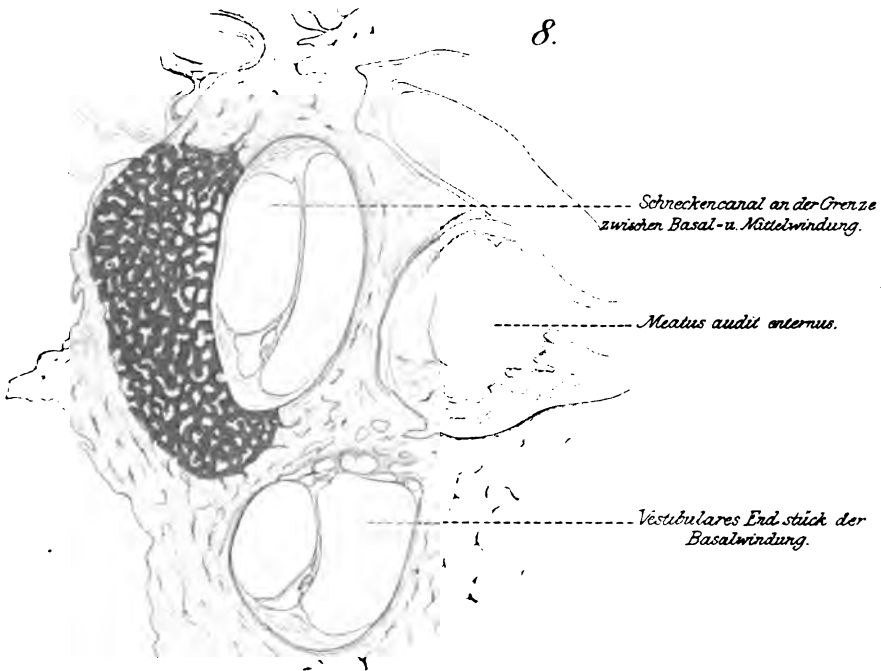
CASE I.—E. C., white, male, age twenty-four, admitted to hospital October 10, 1899—died October 24th. Native of Louisiana; bricklayer, married, father of two healthy children; had rheumatism when twelve years old; denies venereal trouble; mother died of phthisis. Data obtained from his wife, patient unable to answer questions satisfactorily.

Has had ear trouble since childhood, both ears being alternately troublesome without incapacitating him from work until three weeks after a recrudescence of the discharge in the right ear, about three months previous. The first unusual manifestations were pain in the head near the affected ear, a rise of temperature, preceded by a chill and general malaise; increase of fever in the afternoon, sleepless nights, no desire for food, and profuse sweats. These symptoms increased steadily in intensity. When admitted to hospital, the following status was noted: Temperature, 102°. Pulse, 135, of poor quality. Poorly nourished, muddy and pasty color, sordes upon teeth; tongue coated, pointed, and dry; eyes droopy and expressionless. Right pupil responds slowly to light and slightly more dilated than left. The general cast is one of intense sepsis with mental involvement. Extremely restless, answers inquiries slowly and inaccurately. Pronounced rigidity of neck. Tenderness over mastoid, which is red and swollen; intense pain in head; talking at random, continually groaning; profuse perspiration alternating with hot skin; purulent middle-ear discharge possessing an odor; the region between the angle of the inferior maxillary and the mastoid process swollen and tender,

¹ Read before the American Laryngological, Rhinological, and Otological Society, June, 1900.



8.



(triculo-ampullaris)

----- Macula utriculi

----- Oberer Umfang des ovalen Fensters
(spongiosirt u. wallartig nach dem Vestibulum zu verdickt)

----- Unterer Rand der Stapesplatte spongiosirt u. mit dem ebenfalls spongiosen unteren Fensterrahmen knöchern ankylosirt.



----- Tympanum secundarium

EDITORIAL NOTICE.

The ARCHIVES OF OTOLOGY is a bi-monthly journal, published in annual volumes of about five hundred pages each, extensively illustrated with cuts in the text, half-tone text plates, and lithographic plates, many in colors.

About three quarters of the space is devoted to original papers, and the remaining quarter to a systematic report on the progress of ophthalmology, and to reports of societies, book reviews, and miscellaneous notes.

The papers and reports are original, and only accepted with the understanding that they are to be published in this journal exclusively. The original papers in the English edition appear in the German (*Archiv für Ohrenheilkunde*) either in full or in more or less abridged translations, and *vice versa*.

Any subscriber that wishes to refer to the original text of a translated or abridged paper may, by applying to the editor, obtain a reprint which, it is expected, he will return after perusal.

Original papers of value from any source are solicited.

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ACUTENESS OF HEARING BEFORE AND AFTER RADICAL OPERATIONS.¹

BY DR. F. WAGNER, IN BASEL.

Translated by Dr. CARL MUND, New York.

IN determining the influence of those diseases of the ear which can be cured only by a radical operation on the function of the auditory organ, "the hearing," we may consider the following questions:

I. What hearing-power remains after the operation?

II. In what way are the indications for performing an operation influenced by the state of hearing?

In connection with these questions we could also ask, what hearing-power will remain when the drum-membrane, hammer, and anvil are eliminated from the system of sound-conduction? This determination can only be very conditional, for the question is not that of a simple exclusion of the drum-membrane, hammer, and anvil, inasmuch as, on the one hand, after the healing there takes place a fixation of the limbs of the stapes or its remains in the cicatrix, as well as a change in the closure of the round window; and, on the other hand, in some cases a greater or less participation of the labyrinth in the progress of the disease indicating the operation may be present.

In 22, including two deaf-mutes, of the 53—4 of these bilateral—cases operated on radically by Dr. Schwendt, the hearing was tested, after the operation, in 13, operated

¹ From the Oto-Laryngological Clinique of Dr. A. Schwendt, Lecturer at the University in Basel.

on one side only,—in 2, operated on both sides, after the operation ; and in 7, operated on one side, before and after the operation.

The testing of the hearing consisted of :

1. Ascertaining the lower-tone limit ; for this the continuous series of Appunn's tuning-forks of 20-21 v. d. were employed.

2. Ascertaining the upper limit by means of Edelmann's Galton whistle (normal upper limit) at division-line o. 6.

3. Ascertaining the hearing-duration *by air-conduction* for a number of tuning-forks.

4. Ascertaining the hearing of speech in the cases operated on both sides.

5. Ascertaining the hearing-duration by bone-conduction and the ratio of the hearing-duration between air- and bone-conduction.

The tuning-forks and their values for the normal ear, which were applied to Nos. 3 and 5, were :

Tuning-forks of Hartmann-Lucaë, clamped.					
		A	A'	c	c'
Duration of hearing,	a) Air-conduction	90	50	50	90
	b) Bone-conduction	28	12	14	21
	(over mastoid)				
Relation of air- to bone-conduction,		+50	+32	+18	+42
(Rinné)					
Unclamped Tuning-forks of Hartmann-Lucaë, of König.					
		C ₂	C ₃	C ₄	C ₅
Hearing-duration,	a) Air-conduction	70	68	32	12
	b) Bone-conduction	—	—	—	—
	(over mastoid)				

The method in testing the hearing is the well-known one. To ascertain the hearing-duration — after Bezold,— the difference between the pathological and the normal hearing-duration was ascertained by experiment, and the hearing-duration, diminished pathologically, was calculated in percentages of the normal.

In order to control, sometimes the test was worked out in such a way that the hearing-duration of the pathological ear was found directly by the average value from several

trials, which then is to be calculated, in the manner given above, in percentages of the known normal hearing-duration. This method seems to yield more accurate results, inasmuch as by it we eliminate our own disposition to hearing, which differs on different days. Notwithstanding this, the results according to the former methods were decisive, being obtained by the method in general use.

The second method, however, always was applied in ascertaining the hearing-duration by bone-conduction. This hearing-duration was found by several trials directly by instantaneously applying the tuning-fork A, c and c', at times also c', to the mastoid of the ear operated upon, and the average value computed from this—always with the exemption of all values differing too greatly and therefore being improbable—was simply compared with the known normal value.

I.—What hearing-power does there remain after the operation ?

In order to answer this question, from the states of hearing mentioned above, the following results can be grouped :

1. Low Limit.

The low limit (for 24 auditory organs operated upon) was :

Once at 39-40 v. d. (dis₁) (case No. 1 with exceptionally favorable hearing-power) ;

3 times at the upper end of the contra-octave ;

16 times in the large octave (of this 10 times between E and G) ;

3 times in the small octave ;

once at the beginning (d') of the once marked octave.

Apart from an exceptionally favorable case and three bad cases, which later will be discussed, the field of hearing begins in the large octave, viz., mostly in its middle, between E and G

2. High Limit.

In 20 of the 24 auditory organs examined the high limit was between division 1. 2 and 0. 6 of Edelmann's Galton whistle.

In three auditory organs the high limit was lowered, a fact which, according to general opinion, should indicate a complication of the labyrinth; these cases were as follows:

No. 2;	high limit at division	3.2
No. 11;	" " " "	3.4
No. 13;	" " between "	3.9 and 4.8 varying (with different tests).

Case I (No. 12) remains dubious, relative to the high limit. Although in case No. 2 there were no further symptoms implying a complication of the labyrinth, such, however, were shown to exist in Cases 11, 12, and 13.

After the radical operation, in general the high limit remains normal or almost normal in uncomplicated cases.

3. *Hearing-duration.*

The values of hearing-duration expressed in percentages of the normal can be observed directly in a long and complicated table, which we cannot reproduce in the translation. It is to be mentioned that for c^1 the value of hearing-duration can be fixed less accurately than the other values; with the short hearing-duration for the normal ear—12 seconds—a faulty observation of only 1 second in the percentage is greatly perceptible.

Beginning at the lower limit of hearing in most of the cases, there takes place a gradual and uniform rising of the values of the hearing-duration towards the higher octaves. In some cases these values for the lower octaves remain tolerably even, and rise only beginning from the 2d or 3d octave. This condition is very much pronounced in cases Nos. 4 and 19: the values of hearing-duration remain the same, and that on pretty low scale, and all at once they rise, beginning at the 4th octave; in Case 19 this condition is the same before and after the operation.

Of all values of hearing-duration, probably the most important one is that of c^1 , of that tuning-fork sound, which is found within the part of sound-scale (according to Bezold from $b-g_2$) most necessary for *voice-hearing*. Apart from case No. 1, mentioned before, the value of *hearing-duration*

for c' remains 50 % below the normal hearing-duration in all the remaining cases.

The average value of the hearing-power in 21 cases (Cases 11, 12, and 13 were not included for reasons to be given later) is 33 %, viz., $\frac{1}{3}$ of the normal hearing, a fact which does not by any means correspond to a uniform fraction of the hearing-activity.

4. *Voice.*

To what extent now does this 33 % suffice for hearing speech?

To test for perception of speech the cases operated upon monolaterally would lead to no perfectly unobjectionable result. The hearing-power of the operated ear will in all cases only constitute a fraction of the other one not operated on, whether the hearing-power of the latter be normal or reduced; the ear operated on, possessing only a fraction of the hearing-power of the other ear, will, therefore, never be much utilized.

Even if by closing the ear not operated on one can exclude it from the hearing-test, the result of the voice-test will not be adequate to the actual hearing-power of the ear operated on, for the reason mentioned above. However, if it is impossible to exclude from the testing the ear not operated on—and this almost invariably will be the case if it possesses normal hearing-power—then a monolateral test is by no means practicable.

True and unobjectionable results are produced only by testing cases operated on bilaterally, for in such cases the one ear can readily be excluded, and an ear tested which is accustomed daily to hear the voice.

Of the two cases operated on bilaterally, case No. 14 has a hearing-duration of 25–28 % for c' , thus a little below the average value computed before; No. 15, a hearing-duration of 28–31 %, thus almost equal to this average value.

Speech-test in case No. 14, B. Jacob; operated on when 7 years of age; now 12 years old.

Whispered numbers:

The numbers with high consonants: }
(6, 7, etc., alone and in combinations) } heard at 10–20 *cm.*

The remaining numbers only near the ear :

The numbers 9, 100, etc. $\left\{ \begin{array}{l} \text{R, not at all.} \\ \text{L, at ear with difficulty.} \end{array} \right.$

Whispered words (according to Wolf) :

Words of the high or middle group $\left\{ \begin{array}{l} \text{Säge, Feder, Tante, Kette, etc.):} \\ \text{heard at 10-20 cm.} \end{array} \right.$

Words of the low group $\left\{ \begin{array}{l} \text{Ruhe, Bruder, Reiter, etc.):} \\ \text{not heard, or only in fragments.} \end{array} \right.$

Lingual *r*, not, on either side.

Toneless sharp *s*, at 10-20 *cm* well.

Ordinary speech well heard.

The boy is attending school with success. His own voice is loud, but not shrieking.

Speech-test in Case 15 ; operated on when thirteen years of age ; now eighteen years old. (R without stirrup, which during the operation was removed, together with the hammer, to the head of which it was adherent by its foot-plate.) Whisper voice heard much better on the right side, the one without the stirrup, than on the left. Whispered voice :

of the high group (7, 6, etc.) $\left\{ \begin{array}{l} \text{R, 3-6 m.} \\ \text{L, at ear — 10 cm.} \end{array} \right.$

of the low group (100, 9, etc.) $\left\{ \begin{array}{l} \text{not at all,} \\ \text{or at ear.} \end{array} \right.$

These values, however, fluctuate considerably ; those just named were obtained by an examination in November ; another examination in July gave as a result of the

hearing-distance R $\left\{ \begin{array}{l} 7-8 \text{ m for numbers of the high group} \\ \frac{1}{2}-1 \text{ m " " low "} \end{array} \right.$

hearing-distance L $\left\{ \begin{array}{l} 10 \text{ cm — at most } \frac{1}{2} \text{ m for numbers of} \\ \text{high group} \\ 10 \text{ cm, for numbers of low group} \end{array} \right.$

Although the values of hearing-duration do not differ much, yet the hearing for speech is far better R than L. Hearing-duration and hearing-acuity of speech consequently do not decrease in the same proportion. Conversation is well understood ; from time to time hearing is made worse by cerumen, after the removal of which hearing is the same

as before. His own conversation is held in the usual conversation tone.

The hearing-power after radical operation is perfectly sufficient for hearing the language already acquired; so far it is impossible to give an opinion as to whether it also would be sufficient for acquiring a language.

5. *Results of Testing Bone-Conduction. (Weber-Schwabach-Rinné's test.)*

These tests, on frequent repetitions, did not always give perfectly uniform results; nevertheless, from the figures obtained, relatively the average values, it is possible to form a general picture of the character of the test.

The tuning-forks A, c, and c' placed on vertex (Weber's test) in the cases operated upon monolaterally:

11 times were lateralized to the ear operated on;

6 times the test was doubtful;

3 times the tuning-forks were lateralized to the ear not operated on.

In the cases operated on bilaterally, the test in one case remained doubtful (Case 14), in one case R > L heard (Case 15, R side without the stirrup).

With regard to the hearing-power by bone-conduction (from the mastoid process of the ear operated on) and its relation to the hearing-duration with the normal ear (Schwabach's test), the following is to be noticed.

To be excluded are cases Nos. 11, 12, and 13, in which the tuning-fork, placed on the vertex, was lateralized to the side not operated on, as in these cases it is not certain whether the value of hearing-duration of the tuning-fork placed on the mastoid process of the ear operated on really refers to this ear.

In the remaining 19 cases the hearing-duration in relation to the normal was:

in 7 cases decidedly prolonged;

in 11 cases not prolonged; and

in 1 case (No. 4) it remained the same for the tuning-forks A and c; for c' the hearing-duration was shortened.

The determination of the relation of air-conduction to

bone-conduction (Rinné's test) for the tuning-forks A, c, and c' gave as a result a preponderance of hearing-duration by bone-conduction over that of air-conduction (Rinné negative). Exceptions to this were:

The repeatedly mentioned case No. 1, in which Rinné's test resulted — for A, but shortened + for c and c', a further evidence of the exceptionally favorable conditions of this case.

In case No. 16, Rinné's test was — for A and c, shortened + for c'. There also is to be mentioned that in Cases 19 and 21 Rinné's test for tuning-fork c', which before the operation was ± 0 , relatively shortened +, turned out to be — in both cases after the operation.

This perception of low tones chiefly by bone-conduction in general indicates an impediment in sound-conduction, which by air-conduction only can be overcome by the sounds of the higher octaves.

In considering, on the other hand, Cases 11, 12, and 13, which were several times mentioned before, the following must be called to notice:

Nos. 11 and 13 have a decidedly reduced high limit; in No. 12 this was doubtful.

In all three cases there is a lateralization of the tuning-forks placed on the vertex, to the side not operated on.

In Case 11, the hearing-duration for A, c, and c₁ by bone-conduction, in proportion to the normal, is decidedly shortened both when the tuning-forks are placed on the mastoid process of the ear tested, or of the other ear; in Cases 12 and 13, the values of hearing-duration by bone-conduction are about equal to the normal, but according to the result of Weber's test they may as well be referred to the ear not operated on.

In connection with this it should be mentioned that in these three cases, as compared with the others, the low limit lies very high, and that the values of hearing-duration are trifling.

Case No. 2, which also has a reduced high limit, does in other respects not differ from the other cases.

The conditions in Cases 11, 12, and 13, which showed a

reduction of perception for all sounds, as well for low (reduction of bone-conduction), for the intermediate, and high (reduction of hearing by air-conduction), as also for the highest (reduction of the higher limit), cannot be accounted for completely by impediments of sound-conduction present, but only by a complication situated in the labyrinth.

If these three cases excite the suspicion of having labyrinth complications, the latter undoubtedly is present in Sch. Otto, the deaf-mute mentioned before. He has a complete deficiency in his field of hearing on the right side, occupying the upper half of the 4th octave, while on the better-hearing left ear, in the very same region there takes place a depression, the very loud sounds being heard only near the ear and incomparably worse than the remaining sounds. This condition indicates that bilaterally the same spots in the labyrinth, possibly in unequal intensity, must be affected. In reviewing the results of our hearing-tests, we obtain, after the radical operation, a field of hearing corresponding to the amount of hearing which in uncomplicated cases begins at the large octave increases from octave to octave, and approaches the normal or almost normal limit.

If of the uncomplicated cases we compute for each sound an average value from the obtained percentage values of hearing-duration, we obtain the following field of hearing, which probably could be modified by a greater number of observations:

LOWER LIMIT	Hearing-duration in % of the normal							HIGH LIMIT
	A	c	c ¹	c ²	c ³	c ⁴	c ⁵	
IN THE LARGE OCTAVE.	13,	17,	22,	33,	40,	60,	70	NORMAL OR AL- MOST NORMAL.

The hearing-duration by air-conduction is reduced for all tuning-fork sounds, for the lower ones (up to c¹), it is less than the hearing-duration by bone-conduction, even if the latter were not increased in proportion to the normal.

II.—In what way are the indications for performing an operation affected by the state of hearing?

Here again we can differentiate.

1. In what way is the hearing-power existing before the operation affected by the operation itself? and

2. In what way are the indications for performing the operation affected by the result of a hearing-test?

The first question is partly answered by the already obtained proof of the existence of a certain hearing-power after the operation. If we then compare the conditions of hearing, which were taken before and after the operation in the same case, we find them to be almost even in cases Nos. 16, 17, 18, and 19. (The differences probably could be accounted for by erroneous observations. In connection with this let us once more point to the same peculiar condition before and after the operation in case No. 19.)

No. 20 shows a slight improvement, Nos. 21 and 22 a slight change for the worse. Patient No. 21 claimed to hear a little worse than before the operation. Although the percentage values of hearing-duration did not differ very much, at least not more than is allowed for errors of observations, this claim nevertheless appears right and is accounted for by the fact that Rinne's test, which before the operation was a very much diminished +, became — after the operation, without an increase of the bone-conduction having taken place, due to a greater diminution by air-conduction. In Case 22 the change, also only slight, shows itself in the entire field of hearing. With this patient it is to be noticed that the healing was greatly retarded by granulations, which formed on the floor and at the adjacent part of the median wall of the tympanic cavity. It is quite possible that this resulted in a closure of both windows by means of a dense cicatricial tissue. This similar or, at least in general, only slightly changed condition of hearing-power before and after the operation proves that the impediments to sound-conduction must be the same, or if this were not the case, at least the same in regard to their effect.

In all of the seven cases mentioned the system of sound-

conduction was deficient. The conditions (partly otoscopic, partly found at the operation) were the following:

CASE.	DRUM-MEMBRANE.	HAMMER.	ANVIL.	STIRRUP.
16	Destroyed.	Destroyed.	Present.	Visible, easily movable.
17	"	"	"	"
18	Large perforation.	"	Carious.	Not visible.
19	Destroyed.	Present.	Present.	" "
20	"	Destroyed.	Destroyed.	" "
21	"	"	Present.	Visible, movable.
22	Perforation of membr. Shrapnelli.	"	Destroyed.	" "

The remainder of the ossicles always were removed at the operation. It is readily understood that in cases in which there is a loss of continuity between stirrup and the peripheral parts of the chain of sound-conduction (18 and 22), the latter do not come in consideration for sound-conduction. If the anvil is still present, it is very doubtful whether it is in connection with the stirrup, even if macroscopically a caries of the process is not noticeable. The fact that at the operation the anvil is readily extracted proves that the connection is certainly only a very loose one. The functional examination shows that these remnants are of no account for sound-conduction. In three cases in which the anvil was present, the hearing-power remained the same, also in one case in which anvil and stirrup were separated; and in one case in which the anvil was present, there was a slight change for the worse.

This appears to prove that the hearing-power is not affected by the rest of the drum-membrane and ossicles which were still present before the operation.

The changes in the hearing-power, which always are but trifling, we may attribute to the condition after the operation: greater or lesser motility of the stirrup, enveloped in cicatricial tissue, more or less dense, tissue formation in the niche of the round window. Consequently in such cases in which the disease in the ear has progressed to such an extent that all the symptoms indicate the necessity of an operation, the hearing-power is reduced to such a fraction that

(complications excepted) it will not, or only to a very small degree, be affected by the operation.

Therewith we come to the second part of the question, in what way a given condition of hearing could influence the indication for performing the operation.

If the condition of hearing obtained by examination is within the limits given above, taking it for granted that the hearing is not essentially changed by the operation itself, and that a certain portion of acuteness of hearing is irrecoverably lost by disease of the ossicles and the walls of the tympanic cavity, it might be the determining factor in advising an operation.

On the other hand, in case the state of hearing be relatively better than the average value (or rather than in the most favorable case of our series), we are justified in taking it for granted that the system of sound-conduction is pathologically, not at all, or only very little at fault, and that an expectant and non-operative treatment could still further improve the function. Of course it has to be admitted that in such a case even the other symptoms would not be urgent for an immediate operation, so that this consideration is more of a theoretical nature. Nevertheless, there are cases in which there is a doubt in regard to performing an operation, and where the state of hearing would possibly point out the proper way. It is, however, not intended to deny that this state of hearing may be obtained by a simpler method of testing. But Dr. Schwendt never operates without having sufficiently completed the picture of symptoms by hearing-tests.

In the series of the other indications for the performing of an operation, the state of hearing always occupies only the second place; in doubtful cases, however, it may designate expectant treatment to be desirable or futile.

I am indebted to Dr. A. Schwendt for suggesting the subject of this paper, and furnishing me with all the material required for its preparation.

ON DISEASES OF THE ORGAN OF HEARING IN PERNICIOUS ANÆMIA.

BY DR. SCHWABACH, BERLIN.

Abridged Translation by Dr. JULIUS WOLFF, New York.

IN his paper on "Hemorrhages into the Labyrinth Following Pernicious Anæmia," read before the Otological section of the Tenth International Medical Congress at Berlin, Haberman drew attention to the striking fact that no cases of hemorrhage into the ear in pernicious anæmia had as yet been reported, although bleeding into other organs, especially the retina, was frequently observed. He sees the explanation for this in the rarity as well as in the rapid and usually fatal course of pernicious anæmia, which prevents the attention being drawn to the ear symptoms.

In my search of the literature on this subject, I could find no other reference to it except a brief mention by Brieger of a case of hemorrhage into the tympanic cavity accompanying pernicious anæmia, in which the extravasation of blood was followed by suppuration after plugging of the nostrils. It does not, therefore, seem to me out of place to report a case of this kind which I had the opportunity to observe in one of the hospitals of Berlin and in which I was able to make a microscopic examination of the organ of hearing. At the same time I will report several other cases which during the past few years were referred to me for otological examination by the directors of the medical department of this hospital, Dr. A. Fraenkel and Dr. Stadelmann.

There were seven cases in all; the *first* of which was a woman,

forty-eight years of age, who came to the hospital on Nov. 14, 1894, with pronounced subjective and organic evidences of pernicious anæmia. On Nov. 23d, numerous fresh hemorrhages were found in the fundus oculi, and on the same day the patient complained of deafness in the left ear. Tinnitus had been noticed for eight days past. Examination revealed slight injection of the drum-head and a small ecchymosis upon it. The functional tests resulted as follows: Watch not heard either by air- or bone-conduction, loud voice close to the ear; low tuning-forks not heard, higher ones shortened. Weber to left; Rinne negative. Right ear normal. The next few days, improvement of general condition without change in ear symptoms. Dec. 5th, pain in left ear, tenderness over tragus and mastoid process; purulent discharge from middle ear. These symptoms disappeared under treatment, but hearing did not improve. In January severe general symptoms developed and patient died Feb. 8, 1895.

Examination of the blood at the end of January showed a decrease of hemoglobin to 25%; red blood cells 650,000 on the day before death; no increase in the number of white corpuscles. Marked poikilocytosis; some nucleated red blood cells. The findings at the autopsy were: general anæmia, fatty heart, myocarditis, swelling of the spleen, parenchymatous nephritis, old scars in the stomach, and swelling of the lymphatic glands. The anatomical examination of the ear could not be made.

CASE 2 was a woman, fifty-six years of age, admitted Oct. 28, 1895. In March she first began to complain of ill-health and at the time of her admission presented numerous symptoms from which the following diagnosis was made: Essential pernicious anæmia, insufficiency and stenosis of mitral valve. Percentage of hemoglobin was 20-25, number of red blood cells only 500,000; marked poikilocytosis. On Nov. 12th, patient complained of noises and deafness which had appeared suddenly the day before in both ears. On the following day, pains in both eyes, especially the left. Ophthalmoscopic examination revealed numerous retinal blood spots. Vision normal.

Examination of the ears: *A. D.*: Watch heard on contact, not heard by bone-conduction; whispered voice at 1 m. Low forks not heard, c^{iv} shortened 15 sec.; c on right mastoid prolonged 2 sec. Rinne negative. *A. S.*: Watch not heard at all; whispered voice, close to ear. Forks not heard through air at all; through

mastoid c shortened 4 sec. Weber to right. Membrane on both sides appears dull ; no reflex.

As the patient's general condition improved somewhat, she left the hospital on December 20th, at her own request. Number of red corpuscles had increased to 1,716,000, and the hearing on the right ear was slightly better, whisper at 1.5 *m*. On January 30, 1896, she was readmitted in a moribund condition. Death followed on the very next day.

It was not possible to examine the ears again before the patient died. On January 31st an autopsy was performed. All the organs were found to be extremely pale and showed slight icterus ; otherwise they presented no marked pathological conditions. For purposes of microscopic examination the petrous portion of the right temporal bone was hardened in Müller's fluid, decalcified in 10 % nitric acid, rehardened in alcohol, embedded in celloidin, and cut in series perpendicularly to the long axis of the bone. Staining of the sections in hæmatoxylin and eosin. A number of specimens were stained according to Weigert in order to examine the auditory nerve. The results were as follows : In the mucous membrane of the Eustachian tube, particularly of its bony portion, was a moderate infiltration with small cells which increased in density in the direction towards the tympanic opening ; vessels rather well filled, the epithelium everywhere well preserved. The mucous membrane of the tympanum presents in its anterior portion a fairly dense small-celled infiltration ; it is slightly thickened, and is studded here and there with small hemorrhages. In the posterior portion the hemorrhages into the mucous membrane are more numerous, while the floor of the tympanic cavity is occupied by a considerable quantity of free, extravasated blood, as is also the niche of the oval window. Medially this extravasation goes over gradually into a rather thick layer of fibrin which, in turn, borders on some newly formed, vascular connective tissue. The latter extends over the mucous membrane of the base of the stapes and of the adjacent parts of the niche and promontory, the mucous membrane at these points being bared of its epithelium. At several other points of the tympanum a similar condition exists, and here and there a fibrino-purulent exudation covers the mucous membrane. Extravasations of blood are also present in the attic, and in the region of the posterior Tröltzsch's pocket. Here also, as well as around the malleus and incus, the mucous membrane is thickened, infiltrated with small cells, and filled with

distended vessels; the same condition prevails in the cells of the mastoid, where extravasations of blood are also to be seen. In addition to a small perforation in its anterior inferior quadrant, the tympanic membrane presents a subepidermal hemorrhagic vesicle, 5 mm long and 2 mm thick, whose bloody contents seem to be interspersed here and there with leucocytes. The cuticular layer of the membrane is very much thickened and contains numerous over-distended blood-vessels.

Nowhere in the cochlea, vestibule, semicircular canals, and auditory nerve or its branches can the slightest trace of a hemorrhage or small-celled infiltration be recognized; nor does Weigert's stain reveal any pathological conditions in the nerve.

CASE 3 was a woman, thirty-one years of age, who was admitted on January 20, 1897, and died as early as February 17th. She presented no objectively discoverable changes in her ears and no impairment of hearing. She complained of subjective noises in both ears, which had appeared, together with the onset of general symptoms, four years before. There were no hemorrhages in the fundus of the eye, but the skin of the extremities was studded with them. An autopsy was not allowed.

CASE 4 was a man, fifty-five years of age, of whose subjective symptoms nothing is known. An examination which I made only a few days before his death revealed nothing more than peripheral dulness of the membrane. On account of the delirium, which lasted till death, the hearing could not be tested. Hemorrhages in the retina of each eye.

In CASE 5 also (shoemaker, fifty-two years of age) no data concerning the subjective symptoms relating to the ears were at hand. When I saw the patient he was in a somnolent condition, and no objective changes were discoverable. Hemorrhages in the eyes. Death ensued after a few days.

CASE 6 was a workman, nineteen years of age, who, though he complained of dizziness and slight tinnitus, had normal hearing. Objective examinations revealed normal conditions in both ears. In this case also there were hemorrhages in the fundus of each eye. Death after eight weeks. In two of the last three cases, an autopsy was made, but the temporal bones could not be obtained for an anatomical examination.

CASE 7 (painter, fifty-seven years of age) remained in the

hospital only two weeks, when his improved condition allowed him to leave it. Examination of the blood had revealed the characteristics of pernicious anæmia. Following a fall on his head while still a child, the hearing of the right ear had been lost; the left ear remained healthy until recently, when he noticed pulsating noises on that side. Hearing *A. D.*: the watch and voice cannot be heard at all, neither by air- nor bone-conduction. Fork *c* not heard through the air; on mastoid it can be heard, but shortened by 5 sec. *A. S.*: watch heard on contact only, but not through bone; whisper in 2-3 *m.* Hearing of fork *c* shortened by 17 sec. through air, by 3 sec. through mastoid. Rinne negative on left side. Weber lateralized to left. Otoscopic examination showed dulness of right *Mt* and retracted scar in posterior superior quadrant; on left side, dulness of *Mt* and foreshortening of hammer. Hemorrhages in the eyes present in this case also.

A review of the ear symptoms of these seven cases shows that in five of them subjective noises were present; by three of these patients the noises were heard in both ears and by two in one ear only. The two remaining cases could give no information on this point on account of their condition (delirium, somnolence).

Deafness was complained of by three of the five patients by whom subjective noises were heard, but in one of them only one ear was affected, and in another the deafness of one ear was due to an old traumatism, so that this ear must be left out of account. There remain, therefore, four ears in three of which the hearing was markedly impaired (voice close to ear), while the fourth could distinguish whispered words at 2-3 *m.* Accurate tests with tuning-forks could be made in only two of the above patients (Nos. 1 and 2), comprising three affected organs of hearing, and in another (No. 7) air- and bone-conduction were tested with fork *c* only. The results of the examination of the first three ears were as follows: Low forks (16, 32, 48 vibr.) were not perceived in any case; *c* (128 vibr.) and *c*^{iv} (2048 vibr.) also were not heard by one of the ears, while the period of perception of the two remaining ears was shortened for these forks. In two of the ears perception of *c* through mastoid was lengthened

by 7 and 2 sec. respectively, in the other shortened by 4 sec. Rinné was negative in two ears, and in the third was of no value as a test since c could not be heard at all through air. These results of the hearing-tests allow us to come to the conclusion that *in Cases 1 and 2 (Rt.) we have to deal with an affection of the sound-conducting apparatus.* In Case 7, however, the examination was too incomplete to permit the forming of even a probable diagnosis. Objective examination with the reflector showed a condition worthy of note in the first case only. It consisted in a small ecchymosis in the membrane and diffuse injection of the latter, followed later by suppurative otitis media with perforation of the membrane and a pulsating light reflex.

Whether our localization of the cause of the deafness in the two accurately tested cases, namely, in the sound-conducting apparatus for Case 1, and in the sound-perceiving apparatus for the *left* ear of Case 2, is correct or not, must remain undecided, since anatomical proof could not be obtained. But as for the *right* ear of Case 2, the correctness of the conclusion arrived at by means of the tuning-fork tests, which led to the diagnosis of an affection of the sound-conducting apparatus, was fully substantiated by the anatomical examination. The latter showed that while the sound-perceiving apparatus was entirely normal, the middle ear presented in various regions anatomical changes in the shape, principally, of extravasations of blood. These, especially by their encumbrance of the oval window, are ample, according to the present generally accepted views, to account for the symptoms that were observed during life, namely deafness, subjective noises, negative Rinné, etc. That the deafness and subjective noises were due to the hemorrhages around the oval window is made even more probable by the suddenness with which these symptoms appeared. The absence of vertigo throughout the patient's sojourn in the hospital is also in harmony with the anatomical findings, inasmuch as the labyrinth was entirely uninvolved. Still we are not justified in drawing hard and fast conclusions from this fact, since we know nothing of the pathological condition of the *left* ear, although the functional tests pointed

strongly to an affection of the sound-perceiving apparatus on that side.

It is a source of much regret that the left ear could not be subjected to a microscopic examination as well as the right, for if in this ear also the vestibule and semicircular canals had been found to be normal, this would have been a strong support to the theory which supposes these parts to be organs for maintaining the equilibrium, because even with such severe anæmia of the brain, symptoms of vertigo were not present. In Habermann's case, where extensive hemorrhages were found in the vestibule and semicircular canals, marked vertigo was indeed present.

The fact that nothing more than merely slight dulness of the membrane could be seen on otoscopic examination during the patient's first sojourn at the hospital is readily accounted for by the hidden location of the hemorrhage in the niche of the oval window, which was accountable for all of the symptoms. The hemorrhagic vesicle, which was found post-mortem in the drum-membrane, must be ascribed to a renewed hemorrhage into the ear prior to the patient's second admission. This assumption is borne out by other microscopic findings. There was a fresh hemorrhage in the niche of the oval window, which, however, was superimposed upon a thick layer of fibrin that bordered on some newly formed connective tissue covering the mucous membrane of the base of the stapes. The rather dense infiltration of the tympanic mucous membrane and the distension of the blood-vessels are evidences of an inflammatory process following, probably, an infection from the naso-pharynx, and resulting in the destruction of the epithelium of the mucous lining and organization of the extravasated material.

In concluding, I desire to draw attention to a certain analogy that exists between the few published cases of disease of the ear in pernicious anæmia and the conditions found in leucæmia. In each disease we may observe, either with the onset of or following the general symptoms, sudden or rapidly developing deafness, more or less pronounced in degree, together with subjective noises and not infrequently also vertigo, these symptoms being due to hemorrhages in

different parts of the ear. In a former article on the lesions of the ear in leucæmia I have shown how any part of the organ of hearing, from the external meatus to the auditory nerve, may be the seat of hemorrhages. By the two existing anatomical examinations of organs of hearing affected in pernicious anæmia, namely, the one of Habermann and the one of the author, it is also shown that both the sound-perceiving and the sound-conducting apparatus may be the seat of the anatomical changes.

A NEW CASE OF MASTOIDITIS IN A DIABETIC PATIENT.¹

BY DR. MUCK, ASSISTANT.

Translated by Dr. NOLTE, New York.

F. W., aged forty-seven, an official of Rostock, had biliary colic six years ago, and had diabetes for two years. He complains greatly of thirst and has a ravenous appetite. It appears that he never restricted himself to a strict diet. He is accustomed to quench his thirst with great quantities of beer, and at times he would drink considerable whiskey in addition.

Beginning of March, 1899, he contracted a severe cold and at the same time had gastric catarrh, with profuse diarrhoea and icterus.

On the 7th of March he had intense pain in the right ear, and with it severe epistaxis, which he had had on previous occasions. The following day he had a hammering in his right ear, severe headache, and became hard of hearing.

The apparently strong man visited the aural clinic on March 8th. The examination revealed slight pain upon pressure over the right mastoid region, swollen glands over the sterno-cleido-mastoid muscle, and highly reddened and greatly bulging membrana tympani. Whisper could only be heard close to the ear. On paracentesis a considerable quantity of blood-stained secretion escaped. Strips of gauze were put into external auditory canal and a permanent moist dressing applied.

Shortly after the paracentesis the patient vomited and collapsed. After fifteen minutes he apparently had a highly marked icterus which did not exist before the paracentesis. Evening temp. 39°. Pulse 90. Two per cent. sugar in urine. No chloride of iron reaction.

¹ From the Rostock Ear and Throat Clinic.

March 9th.—New dressing. The gauze in the meatus was saturated with bloody serum. Temp. 38°.

March 11th.—Dressing changed. Gauze in canal moderately stained with yellowish-red secretion. Pulse 80. Temperature normal. Great thirst and appetite. Icterus still present. Lower border of liver normal. Bowels regular. Membrana tympani thickened and grayish-red.

March 13th.—Slight amount of secretion of a highly orange-yellow color in the meatus. Icterus still present. The membrana tympani at the site of the paracentesis is covered with millet-sized granulations, which are taken off.

March 14th.—Pain in the ear more intense. Dried secretion of an orange-yellow color on the gauze in the meatus. No pain upon pressure on the tragus. Severe epistaxis during the night. Icterus more marked. No fever. Whisper heard at 25 cm.

March 15th.—Pain increasing in the ear. Auditory canal considerably narrowed. Pain upon touching the tragus and upon mastication.

March 20th.—Inflammation in the external auditory meatus subsided. No more secretion in the canal. Membrana tympani of a grayish-red color and outlines of malleus not visible. Whisper 1.5 m. No more icterus.

March 24th.—Inflammation with considerable pain set in anew in the auditory canal and lasted until April 18th.

April 4th.—A part of the reddened membrana tympani again visible, with a pulsating reflex behind. There is now a little brownish secretion which has a slimy consistency.

On the 19th of April the general health of the patient became worse. The facial expression changed. Small pulse, no fever. Complains occasionally of neuralgic pain radiating from the ear towards the top of the head. Antrum pit and anterior border of the mastoid process painful upon pressure, but without any periosteal swelling. Flat glands are noticed below the pit. The percussion notes of both mastoid processes are alike. There is sagging on the posterior meatal wall; on the anterior wall a slight infiltration, painful upon mastication. Yellowish-brown pus in the meatus and in the depth a pulsating reflex.

April 20th.—**Operation:** Straight vertical incision, touching the insertion of the muscle. The bone was yellowish-red. The cortex, compact, very hard, almost 1 cm in thickness, showed blood spots in the antrum pit. Immediately underneath were

several empty air cells lined with a congested mucous membrane. Suddenly pus and blood welled forth from behind, without any pulsation, from a fistula filled with granulations, which led down to the antrum through hyperæmic softened bone. The latter was occupied by purple granulations, and was greatly enlarged downward by bone necrosis. The antrum was fully exposed and thoroughly cleaned.

April 21st.—Patient felt very well and showed a very striking improvement in his general appearance.

April 26th.—Dressing changed; meatus dry.

May 31st.—The cavity nicely diminished. At the last dressings the appearance of the granulations was surprising. They were broad and flat, instead of light-red and knob-shaped, so that the cavity appears spread evenly with dark, reddish-brown, soft granulations which bled readily and appeared almost to run into one another. The wound secretion was dark brown.

June 16th.—After an interval of almost eight weeks, the wound was perfectly healed, with a deep indrawn scar entirely covered with skin. The ext. aud. meatus still narrow. The visible portion of the membrana tympani seemed to be thickened and lustreless. No secretion. Most of the whispered words are understood at 6 m.

REMARKS.

This case of mastoiditis in a diabetic patient is the fourth one which Prof. Körner has observed. (Compare *Arch. f. Ohrenheilk.*, Bd. xxix., S. 61, *Zeitschr. f. Ohrenheilk.*, Bd. xxiii., S. 234, und Bd. xxviii, S. 285.)

As Eulenstein will publish an extensive paper on the diseases of the ear and temporal bone in diabetics, we only wish to point out the peculiarities of this case.

The disease here occurred in a mastoid process with a thick and compact corticalis and a scanty, spongy, and pneumatic interior. Contrary to Körner's other cases, the mastoid processes of which were filled with pneumatic cells, the necrosis of this mastoid had not been so far advanced. The thick, compact, but not softened corticalis explains also the absence of the dampening of the percussion note over the bone. During the presence of the icterus the color of the secretion was noticed at first to be yellowish, later orange.

An examination by Prof. Kobert showed that the color of the secretion was not due to gall pigment, for the examination for the latter was negative ; but that it apparently was due to decomposition of the gall pigment, brought about by the bacteria. The brownish color of the pus noticed when the icterus had passed away was caused by the admixture of the blood derived from the soft and rather freely bleeding granulations.

UPON THE COLOR OF LIVING RHACHITIC BONE
AS FOUND DURING MASTOID OPERATIONS
IN RHACHITIC CHILDREN.¹

BY DR. MUCK, FIRST ASSISTANT.

Translated by Dr. H. NOLTE.

AT major operations, the aurist has presumably greater opportunity than the general surgeon to see the interior of a rhachitic bone, for he frequently meets with cases of purulent inflammation of the pneumatic cavities of a mastoid process and of purulent disintegration of the surrounding bone in rhachitic patients.

The macroscopic condition of a rhachitic mastoid during life differs from that on the post-mortem table, where the bone, by decreased blood supply, and perhaps also by other post-mortem changes, has lost the bright rose color which it has during life. Only its softness, offering no resistance to the knife, is alike both in living and dead bones.

The light rose color is not due to the hyperæmia of underlying structure shining through the chalkless bone, for it is the same at the thin squamous portion of the temporal bone as it is at the compact (not yet pneumatized) parts. It is solely brought about by the increase of the vascular and medullary formations.

It is remarkable that this hyperæmic bone does not bleed upon chiselling, as we are accustomed to see it in infectious inflammations of the bone.

To illustrate this statement the publication of the following cases appears justifiable, as nothing is said on

¹ From the Ear and Throat Clinic at the Rostock University.

rhachitis of the temporal bone in the works on pathological anatomy of the ear and temporal bone (Schwartz in Klebs's *Handbuch der pathologischen Anatomie*, Steinbrügge in Orth's *Lehrbuch der speciellen pathologischen Anatomie*, and Habermann in Schwartz's *Handbuch der Ohrenheilkunde*), nor is there anything in the articles devoted to the relations between aural and general diseases (Moos in Schwartz's *Handbuch*, Haug, Friedrich). Finally our cases demonstrated how correct Körner was when, in the introduction of his work *The Purulent Affections of the Temporal Bone*, he says that we in our operations on the temporal bone, in many respects, obtain a better insight into the process of the disease than the pathologist does from a post-mortem observation.

CASE I.—Grete R., eleven months old, from Rostock, contracted in the last days of April, 1899, without any assignable previous disease, otorrhœa on both sides.

Condition May 10, 1899. Peripheral ends of the bones of the forearm enlarged. Tibiæ and fibulæ slightly bent, fontanelles large, no demonstrable cranio-tabes, no rhachitic rosary.

The soft parts over the left mastoid process are infiltrated and posteriorly passed over into œdema extending backward almost to the median line.

No distinct swelling over the left mastoid; considerable discharge from both ears. Temperature, 40°.

Operation in chloroform, narcosis the same day.

After the inhalation of only a few drops of chloroform, and before the patient was fully under its influence, the breathing became remarkably shallow, and just as frequent as the pulse. The movements of the thorax, on the contrary, were rare; the retractions at the stomach pit and the collar-bone were quite deep. After the chloroform mask was removed, an incision was made through the infiltrated soft parts.

Only the incision of the periosteum elicited pain and better breathing. The remainder of the operation without narcosis.

The bone as far as exposed was light rose-colored and soft. A deep distinct impression from the incision through the skin and periosteum is left in the soft bone. The surface of the bone is somewhat rough.

This condition of the bone is the same as far as the squamous

portion is exposed. At the top of the mastoid, between bone and periosteum, several decaying shreds. At the first blows with the chisel the dura of the middle fossa, which was of a dark blue color, but without changes, was exposed. Further chiselling lower down. The bone was so soft that it could be readily removed with the sharp spoon.

The pneumatic cells, which are as yet but little developed, are filled partly with softened, partly with cheesy granulations from the antrum down to the tip of the mastoid process. The dura at the tegmen and somewhat laterally to it was also exposed ; but the bone farther back did not contain these granulations and therefore it was unnecessary to lay the sinus bare. Everywhere in the depth where the bone was brought to view the same light rose color as on the surface was noticed.

Iodoform gauze tamponing. Outdoor after-treatment.

May 12, 1899, a swelling appeared also over the right mastoid process.

May 13th. The operation, under chloroform narcosis (this time without any interruption), showed essentially the same conditions as on the left side.

The healing process on both sides was rather slow ; but otherwise showed nothing unusual.

The wounds on both sides were closed on June 10, 1899. On September 4th, discharge from both tympanic cavities stopped with the closure of the perforations of the drum-membrane.

CASE 2.—Willie H., one year old, from Gustrow. August 4, 1896, a subperiosteal abscess over the left mastoid region was incised and a bone fistula, which led down to the antrum, was scooped out. Discharged, being left in the care of the family physician for after-treatment.

January 13, 1897, the child was brought back with a recurrence of the purulent inflammation of the middle ear, reddening and swelling of scar behind ear, and also with distinct rachitic changes at the extremities. The following was found at the operation, which was immediately undertaken :

A long incision was made between the old scar and the auricle, through soft and hyperæmic connective tissue which extended to the old bone wound, and there was replaced by granulations. The neighboring bone, as far as exposed, was found soft and rose-colored.

The whole operation was done with a sharp spoon and forceps. After-treatment by the family physician. Result unknown.

CONTRIBUTION TO THE KNOWLEDGE OF THE OTOGENOUS DISEASES OF THE BRAIN, MENINGES, AND SINUSES.¹

I. CONTINUATION.²

BY DR. MUCK, FIRST ASSISTANT.

Translated by Dr. H. NOLTE.

CASE 20:—Chronic Mastoiditic Empyema of the Endolymphatic Sac. Perisinuous Abscess. Operation. Recovery.

W. Heinrich, twelve years old, was sent to the ear clinic on May 18, 1899.

History.—Had otorrhœa on right side since early childhood, sometimes accompanied by pain. Three years ago he had measles and five days ago a severe pain started in his right ear, radiated towards the neck and the top of the head, and was accompanied by dizziness. As he vomited yesterday and the day before, his physician sent him here.

Present Condition.—It appeared that his senses were slightly dulled by the transportation, but later, while preparing him for the operation, they again cleared up. Tongue covered with a yellowish-gray coating. Movements of eyes and pupils are normal. No facial paralysis. He presses equally well with both hands and keeps both arms extended for an equal length of time.

Above and behind mastoid process no swelling; but painfulness at the anterior border of the tip. No swelling along the course of the large blood-vessels of the neck. The posterior meatal wall is not bulging. Only a segment of the drum-membrane at the handle of the malleus preserved. Tympanic mucous mem-

¹ From the Ear and Throat Clinic at the University of Rostock—Prof. KÖRNER.

² See ARCHIVES OF OTOLGY, Vol. xxix., p. 172.

brane is covered with granulations. Granulations project from the attic, exuding pus.

Background of eyes normal. Pulse at the time of admission irregular. Before the operation (five hours after admission), pulse very feeble but regular, 84, temp. 36.8° C.

Operation under chloroform narcosis. Beginning according to Stacke. At the depth of 1 *cm* in the sclerosed bone a very fine fistulous passage was found exuding pus from behind. After further exposing the fistula with the chisel and bone forceps, it became evident that the fistula led from the antrum to an empyema of the saccus endolymphaticus, whose wall, which was applied to the bone, was partially destroyed. The empyema cavity contained offensive pus, had unclean walls, and was as large as a good-sized bean. On its outer border it was in contact with the sinus, which in its lowest part, where it turns towards the fossa jugularis, was pushed away from the sulcus by granulations and pus. At this place the sinus wall is grayish yellow, at the knee grayish red. The sinus and the cerebellar side of the empyema of the sac were pulsating. No thrombus could be felt. The granulations in the lower part of the transverse sulcus were scraped away. The bone towards the tip being soft and filled with pus and granulations had to be entirely removed. The middle ear was fully exposed. The granulations in the tympanic cavity were removed. The hammer, whose head was greatly reduced in size and covered with minute granulations, was also removed. The incus was missing. Plastic closure of wound postponed. Three ligatures. Dressing.

May 19th.—In the evening considerable gaining; otherwise regular course. This morning, while patient was asleep, the pulse was full and regular (66 per minute). Temp. normal.

May 20th.—Pulse regular and fairly strong—88–80. Condition good, excepting slight pain in the back of his head. Temp. normal.

May 22d.—The appearance of the patient entirely changed compared with what it was at the time of admission to the clinic. Healthy complexion. During the day little inclination to sleep.

May 25th.—Condition good. To-day first change of dressings. Wound in fine condition and very little secretion.

June 9th.—Secondary plastic operation according to Körner and closure of the retro-auricular opening under general anæsthesia.

June 15th.—Outer dressing changed. Wound closed except at its lower end. Tampon in ear not disturbed.

June 18th.—Entire dressing changed. Flap has become adherent.

June 20th.—The wound cavity toward the drum somewhat narrowed by granulations. These we cauterized with lunar caustic.

June 27th.—Temp. at 4 P.M. 38.0° ; next morning 38.6° , due to an angina lacunaris.

July 2d.—Temp. normal again.

July 26th.—Cavity well epidermized, except the facial ridge and the anterior part of the tympanic cavity.

July 29th.—Epidermization complete, except at the mouth of the tube, where the mucous membrane is preserved but no longer secreting.

Hearing, whispered numbers.

“zwanzig” = 180 cm.

“sechs” = 100 cm.

“hundert” = 20 cm.

The tuning-fork a^1 was heard better from the vertex with the operated ear.

CHOLESTEATOMA OF THE MIDDLE EAR, AND ITS RADICAL OPERATION; WITH THE REPORT OF A CASE.

By C. ZIMMERMANN, M.D., MILWAUKEE, WIS.

Selected Volunteer Paper, Read before the Wisconsin State Medical Society,
June 22, 1900.¹

CHOLESTEATOMA of the ear is a globular tumor of the size of a grain to that of a pigeon's egg, of bluish-white or yellowish color, and a lustre like mother-of-pearl. Its cortex shows the structure of epidermis, and its substance consists of products of the latter, viz., cornified scales, which form concentric lamellæ, like an onion. The central portions frequently contain cheesy detritus from decaying epithelia and thickened pus, and between the lamellæ are found crystals of cholesterine, fat granules, and micro-organisms; sometimes giant cells. Its seat of predilection is the middle ear, chiefly the attic, aditus ad antrum, and the mastoid process.

There is some discrepancy of opinion as to the origin of the disease. Most pathologists identify cholesteatoma of the ear with those of the pia mater and cranial bones, which are considered as regular heteroplastic new-formations, developing from displaced embryonic cells like dermoids or atheromata (Mikulicz), or from detachments of epidermis of the first branchial arch (Kuester). Otologists, however, find this kind, the primary cholesteatoma of the ear, to be ex-

¹ This paper is admitted to these ARCHIVES because, apart from an excellent illustrative case, it gives a good description of Stacke's operation, which, though much discussed in German otological literature, is not yet so widely known and appreciated as it deserves.—ED.

tremely rare, and consider the occurrence of cholesteatoma in the ear as secondary to chronic purulent otitis, which is always present in cholesteatoma, and caused by a conversion of cylindrical epithelium into pavement epithelium, or, most frequently, by an immigration of epidermis.

Habermann observed clinically and proved histologically the continuous growing of epidermis of the external meatus into the middle ear through perforations of the *Mt* or meatus. According to the most favored seat of cholesteatoma in the attic, this process chiefly takes place through perforations of Shrapnel's membrane above the *Mt* proper, but the same has been observed at other portions of the *Mt*.

Apparently after long-standing suppurations the cylindrical epithelium loses its faculty of regeneration, so that the epidermis, which is very resistant against the destructive influence of pus, spreads readily to places formerly covered by cylindrical epithelium. This alone, however, would not lead to the formation of cholesteatoma, since we observe such an epidermization as the result of permanent healing of purulent otitis media with large defects of the *Mt*, and therefore consider its development as very desirable. There must be some other reason for the formation of cholesteatoma which lies in an impediment of disposing of the cornified epithelium, and in an increased production of it. Panse (Haug's *Klin. Vortr.*, ii., 4) observed a slow migration of cast-off epithelial scales from the tympanic cavity of a patient on whom the radical operation had been performed, and he attributes this, as well as the excretion of scales and cerumen from the normal ear, first, to the movements of the lower jaw in mastication and, secondly, to the existence of a free passage. If, owing to peculiar anatomical conditions, the anterior wall of the meatus cannot be influenced by these movements, we have a predisposition to the formation of ceruminous plugs in the normal ear, or, if after preceding inflammations bands have developed which produce recesses and obstruct the passage, an accumulation of epithelial cells will result.

The proliferation of epithelial cells is caused by inflammation, in consequence of irritations that reach the ear from

outside, as water, instillations, etc., or the persistence of chronic suppurations in other portions of the tympanic cavity. The epidermic masses become imbibed with fluid, swell, and decay to very offensive material, and create inflammations of the surrounding tissues, periosteum, and bones, leading to caries and osteosclerosis. Even the accumulation of cornified cells alone is sufficient to destroy the bones by pressure, like an aneurism. This is characteristic of cholesteatoma, and is caused by interference with the nutrition of the bone in consequence of compression and thrombosis of the vessels of the Haversian canals. Thus the recesses of the middle ear may be converted into one large cavity, and the dura mater exposed to a great extent. Cholesteatoma is a chronic disease which may last for many years without disturbing the general health of the patient. It is a complication of chronic otorrhœa in a proportion of 1:5 (Bezold).

The *diagnosis* is made from the presence of stratified epithelium in the middle ear, which may be brought forward with the tympanic syringe or with the probe.

If left to itself, the *prognosis* is very serious on account of cerebral complications, which will result from the progressive wasting of the bone.

The *treatment* consists in removing the cholesteatomatous masses, and in healing the purulent otitis media. This may be done from the meatus, if the cavity is only small and can be inspected. If not, the whole middle ear and mastoid have to be opened, so that the cavity can be examined all over and thoroughly cleansed.

The so-called typical mastoid operation, as defined by Schwartze in 1873, *i. e.*, the opening of the mastoid process by removing the outer table of the bone, has yielded excellent results in cases of acute empyema. In the chronic form, however, it required a very long time of after-treatment to bring about a cure, which often was only temporary, as the otorrhœa persisted or relapses occurred, necessitating a second or even third operation. In such cases it aimed only at establishing a counter-opening through which the middle ear could be irrigated in order to remove morbid products from portions which could not be reached by the operation.

This uncertainty of success led surgeons and otologists to think of means to improve the method of operating.

In 1889, Kuester advised, in all cases of primary suppuration in the tympanic cavity, to remove the entire posterior wall of the external meatus as far as the tympanic cavity, so that every diseased part can be inspected and thoroughly removed with the sharp spoon. The weak point in this procedure is the regardlessness of the function of the hearing organ, not considering the possibility of injuring the labyrinth, the facial canal, or of giving rise to adhesions and stenosis of the meatus. On the other hand, it did not prove sufficient, as it did not expose the attic and the aditus ad antrum.

The observation of Ludewig, that in some cases of chronic otorrhœa the extraction of the carious hammer had to be followed by the removal of the carious incus to effect a cure, led Stacke to suppose that, if the extraction of the carious ossicles proved insufficient, the persistence of suppuration was due to caries of the walls of the attic. He, therefore, removed the lateral wall of the attic and scraped the latter. His results, however, were not favorable. The cases did not recover, unless he opened also the mastoid antrum, which could be probed from the exposed attic. From this he reasoned that it was quite natural that the suppuration of the one cavity should extend into the other, with which it directly communicates through the aditus. Consequently he relinquished the simple opening of the attic and replaced it by a new method (1890), which is called the *radical operation*, and consists in the thorough exposure of all the cavities of the middle ear—the attic, tympanum, aditus, and antrum—by removing their lateral walls.

The opinion of Stacke, that attic disease is always associated with suppuration in the antrum, is, I think, not correct to that extent. I as well as others have observed quite a number of cases of suppuration of the attic which healed after removal of the carious external ossicles and scraping of the walls of the attic from the meatus. As this is a much milder operation it ought to be done in all cases in which there are no certain symptoms of mastoid disease. Should

it prove insufficient, the radical operation may be performed later on.

Stacke's principle was generally adopted. Only the order of the steps of the operation has been modified by others. Zaufal, for instance, and Schwartze commence the operation with the opening of the mastoid process and proceed from there through the aditus into the attic, whereas Stacke reaches the antrum from the attic through the aditus. He prefers this because it enables him to ascertain the condition of the antrum by probing it from the opened attic, the diagnostic value of which, however, seems to be rather doubtful. But it certainly is advantageous in locating the situation of the antrum, which shows considerable variations in different individuals, so that it may not be found if the mastoid is opened from its outer surface, and in some cases the operation could only be finished by finally adopting Stacke's plan. Stacke, of course, also deviates from this method if the corticalis of the mastoid or the meatus show a fistula which may serve as a guide for the chisel.

The operation is done in the following manner: The incision behind the auricle is extended forward on the temporal line, and the soft parts together with the periosteum are detached until the meatus is reached. An elevatory lifts the skin and periosteum from the posterior and upper walls of the meatus as far as the drumhead, where it is severed. The hammer, if still present, is removed and the lateral wall of the attic chiselled away after introducing the "protector," so that the tegmen tympani and the upper wall of the meatus form one plane. After removal of the incus, the probe is introduced into the aditus, which is laid bare by chiselling away the upper posterior wall of the meatus. This must not be done too far downwards, lest the facial canal might be injured. The antrum, the position of which is indicated by the probe, is now opened by removing the lateral portion of the posterior wall of the meatus and the external surface of the mastoid process. Thus the floor of the antrum will form a direct continuation of the floor of the meatus. In only a few cases will it be necessary also to open the hypotympanic recessus, which Kretschmann has called the cellar.

All the cavities of the middle ear are now freely exposed to inspection and can be thoroughly scraped.

Then the skin of the meatus is used for covering the denuded bone surfaces. A horizontal incision divides the upper wall of the cutaneous meatus, which, with a vertical cut from its lateral angle backward and downwards, is transformed into a quadrangular flap. The latter is turned backwards, and pressed against the floor of the antrum by tampons of iodoform gauze. This method of transplantation has been modified by Koerner, Passow, and others.

The chief danger lies in the possibility of injuring the facial canal, which forms a ridge below the aditus, and does not run vertically downwards, but in a more lateral direction to the styloid foramen. Just above the upper posterior angle of the Fallopian canal, in the medial wall of the tympanic cavity, projects the horizontal semicircular canal, which has also to be avoided in opening the aditus.

The operation is only the commencement of the treatment. The *changes of dressing* are of paramount importance for procuring epidermization of the cavities. The developing granulations have to be dealt with in the proper way by tamponade and, if necessary, by cauterization. If the antrum is covered with epidermis, the postauricular opening may be allowed to close, so that finally the whole cavity is nothing but an extended ear canal. In cholesteatoma, which has a great tendency to relapses, it is advisable not to close the postauricular opening, so that the cavities always remain open for inspection, and can be kept open.

This course of treatment has been adopted in the following case of a man of twenty-six years. He came to me March 30, 1897, and presented the following condition :

Left ear : Very large masses of polypi projecting from external meatus. Offensive discharge ; extensive necrosis of middle ear. Removal of polypi, scraping and cauterization of the diseased walls.

Right ear : A large polypus springs from posterior wall of tympanic cavity. Attic filled with offensive cholesteatomatous matter, which was removed. After-treatment until July, 1897.

October 28, 1898, he returned, very much emaciated, with the

history that about a month ago an abscess had formed on *right side* of neck. A fistulous scar, one inch in length, commencing one and a half inches below the tip of mastoid, runs down along the sterno-cleido-mastoid muscle (Bezold's mastoiditis).

Total facial paralysis. Offensive discharge from right ear. Posterior wall of meatus bulged forward, flabby, and covers carious bone. Some cholesteatomatous masses evacuated with probe.

Left ear shows a new-formed *Mt*, with perforation through which a small polypus projects, which is taken away.

November 1, 1898, radical operation. After removing the external surface, the whole mastoid process presents itself transformed into a large cavity filled with offensive cholesteatomatous matter up to the lateral sinus and the dura mater. All the cavities of the middle ear and the posterior cranial fossa are widely opened and thoroughly scraped. A perforation of the medial aspect of the tip of the mastoid process leads into a fistula which runs downward to the fistula on the neck. The tip is chiselled away and the fistula scraped. The medial portion of the posterior wall of the meatus formed a loose sequester, which presented a semicanal, apparently the lateral portion of the Fallopian canal. The dura is largely exposed and thickened. No granulations ever developed on it; it practically exhibited the same smooth surface during the whole treatment as it shows now. The rest of the wound is covered with epidermis and scar tissue. The patient recovered very well, and his hearing is better than before.

The facial paralysis is cured; he can close his right eye completely, only the folds of the face on that side are not as deep as on the other. The after-treatment, up to complete epidermization, lasted six months. When last seen, on December 7, 1899, everything had remained well.

CONTRIBUTIONS TO THE KNOWLEDGE OF INTRACRANIAL COMPLICATIONS OF EAR DISEASE.¹

SECOND CONTINUATION.

By DR. WITTE, SECOND ASSISTANT.

Condensed translation by Dr. H. KNAPP.

CASE. 21. Phlebitis of the lateral sinus from chronic otorrhœa and mastoiditis. Pyæmia. Mastoid operation with opening of the sinus and ligation of the internal jugular. Opening of an abscess at the occiput. Death by pulmonary metastases.

G. Schm., æt. six. Rachitis in first year. Weak constitution. Otorrhœa of both sides, without assignable cause. Syringing with boric acid water. Otorrhœa persistent. August 29, 1898, swelling behind the left ear with grave general symptoms.

Condition on admission to the clinic, August 31st: Emaciated, pale, and weakly child. Respiration, 36–40, accentuated over the whole right lung. Sensorium free. Veins greatly dilated in the right half of face and head, at the neck equal on both sides. Venous bruit weaker on left side of neck. Left ear canal filled with pus and cheesy particles; right ear canal dry. Periosteum of left mastoid somewhat swollen and very tender. Below the mastoid and at the maxillary angle slight swelling, at the neck along the large vessels neither cord nor glands to be felt. Temp. at 4.30 P.M. 39.6° C.

Operation at 5.30 P.M., 1½ h. after admission. Straight incision from above the temporal ridge along the insertion of the auricle down to the tip of the mastoid, and another horizontally backward from the middle of the former. Copious venous hemorrhage, periosteum easily stripped aside, no emissary vein encount-

¹ From the ear clinic of the University of Rostock—Prof. KÖRNER.

ered. Superficial layer of bone slightly discolored, containing small cavities filled with pus; deeper layers of bone more and more hyperæmic and soft; antrum filled with granulations. The sigmoid sinus is gray and collapsed, leaving an empty space between it and the bone of its sulcus. The cerebellar and cerebral dura mater is discolored in like manner, making it difficult to recognize the limits of the sinus. The pulsations of the dura are easily seen and felt. On incision the sinus was found empty at its knee, farther backward it contained a coherent, reddish thrombus; no pus anywhere. An incision downward was followed by copious hemorrhage, requiring tamponing (iodoform gauze). Now the jugular was tied, with catgut, directly above the entrance of the facial vein. The jugular proved intact, containing fluid blood. Cervical wound partially sutured.

9.15 P.M.—Pulse 128, regular, full; resp. 36; temp. 38.5° C.

September 1st.—Night restless. Condition of patient essentially the same. Eyes functionally and ophthalmoscopically normal. Pat. has neither opisthotonus nor stupor, cough nor expectoration. Wound nothing notable. At the nape of the neck a little below and to the right of the occipital protuberance painful, not fluctuating swelling. In the eve., temp. 38.5°.

September 3d.—4 A.M., temp. 38.0°: 4 P.M., 40.2°. No chill, no perspiration.

September 4th.—Restless night, complains of pain in back of head, and touches the places frequently with his hand. Sensorium free, no vomiting.

7.30 A.M.—Anæsthesia; opening of several small, superficial abscesses at occiput, communicating with one another by long fistulous passages underneath œdematous skin. The tissue underneath the abscesses is discolored, ragged, and decaying. During the operation several brown diarrhœic evacuations of bowels. After the operation pulse 180. Great pallor, lips blue; sensory clear; great agitation. Death, 10.30 P.M.

Autopsy: Some clear, yellow liquid in abdominal and pericardial cavities. In both pleural cavities, adhesions, in the right 150 ccm of turbid liquid.

Upper lobes of both lungs free from focal changes with good supply of blood and air. In lower lobes several foci, the size of a walnut, softened, greenish, and offensive in centre, with small mantles of hepatized grayish-red or purulent pulmonary tissue. Spleen two or three times the natural size.

Pia mater of the brain somewhat thickened in parietal region.

Right lateral sinus normal, left containing gray-red, soft, not quite obturating thrombi. The walls of the sigmoid sinus and the adherent thrombus, gray-green and soft. The thrombus extends into the jugular bulb and the upper end of the jugular vein, without obliterating either. The cervical wound is patent, and leads into a cavity, the size of a walnut, filled with sanious liquid, and surrounded by discolored, disintegrating walls.

Remarks : The operation came too late. It was undertaken as a last resort in a desperate case.

CONTRIBUTIONS TO THE KNOWLEDGE OF
INTRACRANIAL COMPLICATIONS OF
EAR DISEASE.¹

THIRD CONTINUATION.

BY DR. MUCK, ASSISTANT.

Translated by Dr. MAX TOEPLITZ, New York.

(Vol. XXXV., p. 12, 218, and 317 these ARCHIVES, German Edition.)

22. Cerebellar and extradural abscess in the posterior cerebral fossa which had run its course without marked symptoms, and was found and emptied during operation of an acute suppuration of the temporal bone. Recovery.

F. Adolf was admitted to the hospital on April 7, 1900. He could not before follow the repeated advice of his physician, Dr. Schroeder, to be operated at the clinic owing to serious disease of his wife. In February he had an attack of influenza, which had led to suppuration of the right ear. His physician, who had not been consulted until March 29th, had found: "Intense deafness in R. E. Watch on contact only, whispered voice close to the ear. Profuse suppuration. Granulations posteriorly and above in the external meatus. Mastoid process upon pressure slightly sensitive, the whole somewhat swollen." His physician removed the granulations from the external meatus and gave the patient the above-mentioned advice, which was not followed until April 7, when the following condition was recorded at the clinic: Intense infiltrations of the soft tissues behind the auricle, extending, oedematous, upward and forward above the zygomatic arch. Fluctuation not demonstrable. In the external meatus very little

¹ From the Aural and Laryngeal Clinic of the University of Rostock.

pus and at the bottom, granulations attached postero-superiorly. Miserable appearance, yellowish-gray complexion ; pulse regular, full, 80 beats per minute.

The patient would not even now remain at the clinic, but once more travelled to his dying wife ; however, he promised to return on the following day under all circumstances for operation. In order to be injured the least by this delay, the swelling upon the mastoid was immediately incised (without narcosis), whereby profuse suppuration was discharged from a subperiosteal abscess connected with a bone fistula.¹

The patient returned on the following day after taking leave of his dying wife and was immediately operated.

Operation on April 8th : The wound, made by incision on the day before, was enlarged above over the temporal line. The cortex was denuded upon the mastoid pit and presented closely behind the spina supra meatum, a perforation which led into a cavity filled with pus and granulations as far as the antrum. The bone of this cavity was destroyed up to the dura of the middle cerebral fossa, the upper wall of the cavity being formed exclusively by the discolored dura devoid of granulations. A fistulous path led from the cavity backward. In exposing this path with the chisel, suddenly about a tablespoonful of pulsating pus gushed out. After the discharge of the greatest part of this, pus regurgitation took place following every pulsating propulsion. The fistulous path led into the posterior cerebral fossa. By enlarging the canal with chisel and forceps, the dura, uniformly studded with granulations, was laid bare medially from the sigmoid fossa. The exposed dura cerebelli presented pulsating movements, and with each pulsating rise, pus welled out from an opening situated in the dura between granulations. A probe, cautiously introduced into the opening, met soft resistance, only at a depth of 2 *cm.* The cerebellar abscess was drained by a small strip of gauze and loose plugging of the osseous wound. The background and muscular movements of the eye, examined the same evening, were found normal (Dr. V. Zelewsky).

On the day following the operation the temperature rose to 37.6° C., later never exceeded 37.2° C. Six days after opera-

¹ The advantage of this immediate incision by Dr. MUCK, who operated on this case during my absence, was demonstrated at the operation performed after the return of the patient. The bone abscess had prepared a path into the cerebellum, and through the incision of skin and periosteum the cerebellar pus had been emptied.

KOERNER.

tion the drainage tube was removed from the cerebellum. The healing of the wound and of the perforation in the drum membrane took place without disturbance, with preservation of good hearing, and was completed on June 8th, viz., in two months.

23. Extradural abscess of the middle cerebral fossa in acute mastoiditis after measles and angina. Operation. Recovery.

K. Walter, four and one half years old, on December 1st, was seized with measles which, after disappearance of the exanthema, were complicated with angina. Otagia did not occur in the L. E. until December 21st. On the following day, some fluid was discharged from the ear, and, simultaneously, a swelling was noticed behind it.

At the first consultation, on December 23d, the following **condition** was found: Firm infiltration upon the base of the left mastoid process, pushing forward the upper portion of the auricle. The external meatus was filled with macerated and swollen debris. After cleansing, no perforation visible. The membrana tympani was covered with swollen epidermis, bulging postero-superiorly. Malleus not discernible. An incision, made into the bulging part, liberated profuse, clear serum. The wound did not bleed. Ice-bag.

December 24th swelling decreased, discharge purulent. Temperature of from 37.9° to 38.4° C. Admission to the clinic.

On December 25th, swelling and suppuration increased. Fluctuation demonstrable in the evening. Temperature of from 38.0° to 39.3° C.

On December 26th, **operation**: Incision through the swelling up to the insertion of the auricle. Intense infiltration of skin, subperiosteal abscess extending into the osseous external meatus. Bone: Corticalis devoid of blood, and perforated in the mastoid pit. The superficial pneumatic cells contain swollen mucous membrane and some pus. At a greater depth the bone is hyperæmic and brittle. This softening extends into the antrum and to the dura of the middle cerebral fossa, which is covered with granulations, and detached by pus from the bone.

Temperature in the morning (before operation), 37.4° C.; in the evening, 37.6° C.

From December 27th to 31st, irregular fever, between 37.4° C. and 39.2° C. Wound presents gray deposit, and again from January 4th to 6th. From now on course without fever, but markedly

slow recovery. Treatment very much interfered with by the naughtiness of the patient. In March there is still a fistula in the scar of the wound, from which, as well as from the perforation of the membrana tympani, viscid mucus is discharged, which can be removed only by the syringe. The fistula and perforation of membrana tympani do not close before May 3d, but five days later the scar reopened. On May 17th complete recovery.

24. Extradural abscess in the middle cerebral fossa ; mastoiditis from scarlet fever. Operation. Recovery.

K. Hertha, twelve years old.

History : At the end of April, scarlatina ; since beginning of May, bilateral otorrhœa ; swelling of the right mastoid process of a week's duration.

Condition on admission : Redness, swelling, and pressure ; pain of the right mastoid process, and particularly above the auricle, extending far into the temporal region. Profuse suppuration R. and L.

Operation (May 31, 1895, under ether) : Incision beginning 1.5 cm above the temporal line, and down to the mastoid apex. Detachment of the periosteum back and forward, whereupon, above the external meatus, about 10 cm of pus gushed out. Elongation of incision anteriorly and above. Squama of temporal bone is carious to great extent, and at one place perforated by fistula. The diseased portions are completely removed, whereby a portion of the dura of the size of a phalanx of the little finger is exposed in the middle cerebral fossa. It was covered with pus, but free from granulations. The mastoid planum had a reddish color. The sharp spoon readily entered through the soft corticalis into a cavity filled with pus and granulations ; the cavity was then properly laid bare with the rongeur. Dressing with iodoform gauze.

On June 18th, redness and swelling occurred at the *left* mastoid process. Operation on the same day. In detaching the periosteum the chisel discovers softened granulations closely at the posterior wall of the mastoid process. From this place a cavity, filled with pus and granulations and larger than a walnut, is laid bare, which extends far forward and upward. Plugging.

On September 3d, complete recovery on both sides.

The backgrounds of both eyes had been normal during the entire period of observation (Dr. Crull).

25. Extradural abscess in the posterior cerebral fossa in relapsing suppuration of the middle ear. Operation. Recovery.

E. Christian, sixty-nine years old.

History : In 1884 the patient was seized in Constantinople as a marine soldier with "climatic fever." On May 12, 1897, he was treated at the out-door department for suppuration of the *left* middle ear. The suppuration was said to have started six weeks before the beginning of the treatment. It is doubtful whether the suppuration of the middle ear had then been healed, as the patient had withdrawn from treatment.

On August 7, 1898, he returned to the aural clinic on account of intense earache.

Profuse suppuration from the left ear. The disease was supposed to have begun at the end of July.

The treatment of the suppuration of the middle ear was unsuccessful. On September 14th the patient complained of intense pain behind the left ear. The patient was admitted to the clinic for operation.

Present condition : The left mastoid process is sensitive upon pressure, and the soft tissues above it are swollen. In the external meatus much pus. The posterior wall of the external meatus is not sagging.

Temperature : at noon and in the evening 39.6° C.

Operation on September 15, 1898, in chloroform narcosis :

Incision over the left mastoid, $\frac{1}{2}$ cm behind the auricular insertion, from the temporal line to the mastoid apex. Periosteum detached forward and backward. Bleeding spots upon bone in mastoid pit. The first chisel strokes evacuated pus under high pressure.

After exposing the sinus at its knee an extradural abscess, containing about a tablespoonful of pus, was emptied under high pressure. The sinus wall was covered with discolored granulations. The overhanging cortex, chiselled off below the temporal line, laid bare a fistulous path, the size of a pin, which, when followed up, led into a pretty small antrum which was curetted. Dressing with iodoform gauze.

After curetting a softened area of the bone around the antrum on October 20th, which had kept up the suppuration for a time, the healing of the operated wound was completed by the end of December, and the tympanic cavity had become dry.

26. Extradural abscess in the posterior cerebral fossa in acute suppuration of the temporal bone. Operation. Recovery.

L. Heinrich, forty-eight years old, was seized at the end of February, 1900, with pains in the left ear. After enduring for two weeks this agonizing pain, which deprived him of sleep, otorrhœa set in and brought great relief. With the persistence of profuse suppuration, however, soon frontal headache appeared, which became more and more intense.

On April 6th, six and one half weeks after the beginning of the disease, the patient came to the clinic in the **following condition**: Paleness, coated tongue. Profuse suppuration from the left ear. Perforation of the membrana tympani in the postero-inferior quadrant. Bulging of the postero-superior wall of the external meatus. Periosteal swelling and sensitiveness by pressure upon the mastoid process. Temperature normal. Background of the eye and temperature normal.

Operation on the day of admission (Dr. Muck):

Periosteum of the mastoid process thickened, firmly attached to the bone. Cortex yellowish with many blood spots. The cavities of the bone under the cortex had a discolored lining, and at a greater depth up to the antrum were filled with granulations and pus. The granulations extend to the dura of the posterior cerebral fossa. When they were scraped out about a teaspoonful of pulsating pus welled out between dura and bone. The dura exposed to the extent of a ten-cent piece is partially covered with granulations. Removal of the undermined bony edges. Insufflation of iodoform boric-acid powder. Plugging.

Undisturbed recovery without fever, with occlusion of the perforations of the membrana tympani and with good hearing.

May 10th.—Healed, thirty-four days after the operation.

27. Extradural abscess in the posterior and middle cerebral fossæ, with phlebitis and thrombosis of the lateral sinus, after suppuration of the middle ear without destruction of bone in the temporal. Operation. Recovery.

M. Albert, nine years old, was sent on October 22, 1890, by Dr. E. to the aural clinic with the following accompanying letter: "Last year the patient suffered from suppurative otitis media for a long time. Since October 12th, intense pain around the left ear, in the left upper eyelid, the left cheek, and the left lower jaw. Temperature ranged from 38.5° to 39° C. Various remedies have been used without avail for the pain."

On Admission the somewhat pale, but quite robust boy had a temperature of from 37.5° to 37.8° (evening) C. There was torticollis on the left side. No swelling of mastoid and no sensitiveness upon pressure. Left membrana tympani grayish-white and bulging. Numerous injected vessels were discernible with the magnifying glass. Thick pus was liberated by paracentesis. The following day the torticollis and the intense pain in entire left half of the head and at the upper lid had disappeared. Between mastoid and occiput there was fluctuation in a place surrounded by œdema which did not extend forward to the mastoid. By an immediate incision pus was removed and granulations were scraped off. The small sharp spoon did not reveal rough bone, which, however, was discovered in the evening with the probe. Background and muscles of the eyes normal. During the following days the patient's subjective and objective condition was good. Temperature normal, except on one day, October 25th, when it rose to 38.2° C.

Oct. 29th.—The wound made by the paracentesis was dry. The œdema around the incision of the occiput had disappeared; the wound itself presented a grayish-yellow deposit and scanty secretion. The probe revealed rough bone to greater extent, but did not enter into it.

Oct. 30th.—**Operation** in chloroform narcosis. While curetting the wound made previously by incision over the parietal bone, profuse pulsating pus was discharged at once. The fistula situated at the antero-inferior portions of the parietal was enlarged by removal of portions of the bone with the forceps, whereby extradural pus continually escaped. Removal of the bone with forceps as far as the sigmoid sulcus of the temporal bone. The sinus in the sulcus was collapsed and farther backward covered with dense granulations. Irregular, slow pulse, of poor quality and repeated cessation of respiration, necessitated interruption of operation. Dressing with iodoform gauze.

The condition of the patient after the operation not bad: the pulse was small, somewhat irregular, 70 beats per minute, in the evening stronger and regular; temperature normal.

Oct. 31st.—Good condition. Pulse regular, 88. Appetite poor.

Nov. 1st.—Background of the eye normal.

Nov. 3d.—Change of dressing; good appearance of granulating surface of dura and sinus. Perforation of membrana tympani dry and smaller.

Nov. 5th.—Good condition. Eye normal.

Nov. 8th.—Change of dressing. Healthy granulations except those in the lower angle of the wound (region of sigmoid sulcus), which are grayish-yellow. Pulse regular.

Nov. 11th.—Pulse again somewhat irregular; November 12th, regular.

Nov. 15th.—Uniformly granulating surface of good appearance.

Nov. 24th.—Change of dressing. The granulating surface considerably reduced.

Dec. 2d.—Discharged cured. Perforation of membrana tympani closed.

Remarks: The operation exposed an extradural abscess, which had extended over a portion of the occipital lobe, and half of the cerebellum. The transverse sinus was in the province of the abscess covered with granulations, and was undoubtedly thrombosed since its collapse was farther in front viz., centripetal. The extradural abscess had found its way outward through the bone. It could not be positively ascertained whether the intracranial suppuration had originated from the suppuration of the middle ear, observed and removed by us, or from that of the year before. The former view is now probable. The pathway of the pus, which had at one time apparently existed between tympanic cavity and intracranial abscess, could not be found. A destruction of bone in the mastoid connecting both suppurating areas was entirely missing. Furthermore, it is left undecided whether the disease of the sinus had produced the extradural abscess or this the sinus disease. The absence of optic neuritis with a large extradural abscess and the occlusion of the sinus is remarkable. The healing of the sinus phlebitis by emptying the perisinuous abscess without opening the sinus is not unusual.

28. Chronic mastoiditis, sinus-phlebitis and leptomeningitis purulenta. Unsuccessful operation. Death. Autopsy.

K. Hans, eight years old, was sent to the Rostock University ear clinic on November 22, 1899, on account of a suspected brain abscess, following an otitis media suppurativa.

History: The duration of the suppuration from the *left* ear is uncertain. Four weeks ago vomiting, since then considerable prostration and pallor. Vomiting frequently repeated. Five days ago general convulsions with continuous outcries, lasting several hours; since then left facial paralysis and paresis of the left arm.

Condition on admission: Pallor of skin and mucous mem-

branes. Complete paralysis of the face branches of the left facial. Left arm paretic.

Left hand somewhat œdematous. Numerous petechiæ upon neck, breast, and abdomen. Pulse 132, small, but regular. Temperature 36.5° C. Sensorium clear, answers are slow and a long time after the questions. External meatus closed by several furuncles. Between the furuncles blood and pus.

Background of eye: R., choked disc; L., the same, besides extensive hemorrhage, in the region of the disc. Corneal epithelium defective in consequence of facial paralysis. The left sterno-cleido-mastoid muscle so tight as to render the palpation of deeper structures impossible. Skin veins of both sides of neck alike. In the region of the left mastoid emissary vein, nothing extraordinary. (Supplementary note after operation: Under narcosis, the sterno-cleido-mastoid relaxed; the gland under its upper third could be felt.)

No albumen in the urine.

Operation: On the same day, under chloroform narcosis, during which respiration ceased and artificial breathing had to be induced.

Radical operation: The bone was found soft and brittle, but not until the antrum was reached. Granulations in antrum and tympanum.

A fistulous passage led through the bone from the antrum to the sinus, which was found to be covered with granulations in the entire sigmoid curve. By means of the cutting forceps, the sinus was exposed as far as it was covered with granulations, and then slit open. Recent, non-suppurative thrombus; no blood. Region of sinus and cerebellum did not pulsate. By two incisions into the cerebellum much cerebro-spinal fluid and blood were let out. After the puncture, the cerebellum began to pulsate. Owing to collapse, hasty plugging and dressing; injection of chloride of sodium into the rectum; elevation of legs, hypodermic injections of ether.

Nov. 23d.—During the night a great deal of crying and groaning; in the morning the dressing was soaked with cerebro-spinal fluid. His condition was comparatively good until now, for the patient heard, when called, took some nourishment, and was quieter than during the night; he grew considerably worse in the afternoon, stupor.

The œdema of the left hand increased. Slight œdema at the

upper lids, probably through pressure from the bandage. The condition of the background of the eye, ascertained yesterday by Drs. Krukenberg and Plant, is to-day confirmed by Prof. Axenfeld. Temperature in the morning 37.4° C., in the evening 40.2° C. Pulse, 160 beats.

Nov. 24th.—Essentially the same condition as yesterday. The outer dressing was again saturated with cerebro-spinal fluid. Temperature varied irregularly between 37.9° C. and 40.2° C.

Nov. 25th.—Patient gave the physician, on request, his formerly paretic hand. When it was placed above the head, he took hold of it with the right hand, in order to take it down. Facial paralysis unchanged. Edema of the left hand less. During the afternoon extreme restlessness; grasped at the dressing. Petechiæ upon the body not increased. Temperature between 39.1° C. and 40° C.

Nov. 26th.—During the night quieter; prolonged sleep. Sensorium appears less dull. Fœtor ex ore. Temperature of from 38.5° to 40.4° C.

Nov. 27th.—During the night great restlessness, a good deal of crying; no sleep. Sensorium dull. In the morning change of dressing; wound discolored, without granulations, without pus.

Gauze entirely soaked with cerebro-spinal fluid. Patellar reflexes absent. In the afternoon marked opisthotonus. Temperature from 38.6° C. to 40.6° C. Pulse, 140.

Nov. 28th.—Ophthalmoscopic condition as before. Opisthotonus still remaining.

Until Dec. 1st no essential change, then twitching in the right leg, conjugate deviation of eyes toward the left. Convulsions in the right arm continuing for some time. Opisthotonus marked.

In the afternoon: Respiration irregular; after a few consecutive respirations, superficial breathing; later on respiratory intervals lasting up to thirteen seconds. Convulsions in extremities and maxillæ.

Dec. 2d.—Abdominal, cremaster, and corneal reflexes absent. Convulsions less frequent, pulse regular, 180, arhythmic toward evening. Respiration irregular and superficial. Incontinentia urinæ et fæcum. Trismus.

Dec. 3d.—The same condition.

Dec. 4th.—No more trismus and opisthotonus. No convulsions. At 6.30 P.M. exitus letalis.

Autopsy (Dr. Ricker, Abridged Report): Thin cadaver of pale complexion. Petechiæ on neck and chest.

In the posterior cerebral fossa about 20 *ccm* of fluid rendered turbid by pus. R. sinus transversus contains some fibrinous coagulations (buffs). Pia of the base covered and infiltrated with tenacious green pus, particularly at the cerebellum, pons, and medulla. In the fossa Sylvii, the purulent infiltration extends equally to both sides. The inner surface of the dura of the convexity, pale, smooth, and moist. In the longitudinal sinus some buff. Pia of convexity in its entire extent opaque, on the left side, particularly at the cerebellum, on both frontal lobes pia much congested. Left lateral ventricle much enlarged, containing turbid fluid mixed with pus.

R. ventricle the same condition. After removal of the contents, ependyma smooth and well filled with blood; the third and fourth ventricles also enlarged with the same contents. Cerebellum contains little blood, is tenacious; no focal or macroscopic changes in central ganglia, pons, and medulla. Extensive, partly pigmented, adhesions in entire abdomen. Hard tumors of spleen. Pleuritic adhesions anteriorly in the right pleural cavity. Epicarditic hemorrhage of the size of a lentil.

EXAMINATION OF THE TEMPORAL BONE.

(PROF. KOERNER).

Section with the fret-saw parallel with external surface of the temporal bone, passing somewhat medially from antrum and separating the medial from the lateral portion of the tympanic cavity.

In the tympanic cavity, the malleus unchanged, but completely detached, the incus absent; the stapes without limbs, its plate dislocated, apparently through section with saw; the facial canal is open at medial wall of tympanic cavity; pus in porus acusticus internus and in vestibule:

Cerebral side of temporal bone normal, in the posterior cerebral fossa opening from operation. Sinus transversus in sigmoid fossa opened, sinus wound discolored at edges. In the sinus only buff. In bulb of jugular vein near the tympanic floor, non-disintegrated grayish red thrombus. Bony wall of jugular fossa completely intact.

Remarks: The presence of a purulent leptomeningitis, suspected as early as the time of admission, has been confirmed by the further course and autopsy. An immediate operation was resolved upon, owing to the possible existence of a deep-seated

cerebellar abscess (simultaneous paresis of the arm) with septic general infection from the sinus. In this case the patient could have been possibly saved by an immediate operation. Lumbar puncture, through which the incurable meningitis could have been detected, was omitted, since the seriousness of the disease did not admit of any delay, and, in the worst case, it could be hoped that the operation would at least lessen the pain of the patient.

29. Otitic phlebitis of the lateral sinus with pyæmia and sepsis. Extension by starts of the phlebo-thrombosis into the sinus, internal jugular, and anonyma.

D. Wilhelm, eighteen years old, was on March 13, 1900, sent to the aural clinic.

The history of the patient revealed that he had suffered for a year from a suppuration of the *right* ear, which had persisted without interruption, not very profuse, and had never caused any pain. Intense pain did not appear until March 7th in the right ear and the head, when it set in with considerable vertigo and, on March 10th, with vomiting additionally. His physician, who first saw him then, reported as follows: "Temperature 40° C., pulse irregular, complaints of intense headaches, slight sensitiveness of the mastoid process. After cleansing the external meatus of offensive masses, his condition was considerably improved and the temperature fell to 37.4° C. and 38° C. To-day (March 12th) in the afternoon 41.0° C."

Condition on admission (March 13th): Wretched-looking young man; vacillating gait; inclination with eyes closed to fall toward the diseased side. Sensorium free. Pulse regular, 128 beats per minute. Soft tissues covering the right mastoid process without changes. R. apex painful upon pressure; marked tenderness to pressure in the region of the mastoid foramen. Movements of head painful. Passive movements of the head when tried are warded off by the patient with the hand. In the right external meatus plug of gauze with scanty pus.

Membrana tympani: R. perforation postero-superiorly; scanty pus. L. normal. Background and muscles of the eye normal. No paresis of the arms, legs, or facial. At the right side of neck no cord could be felt. External jugulars of both sides equally well filled.

Operation on the same day:

Chiselling according to Zaufal. Periosteum easily detached. Several blood spots in the cortex ; close below which large cavity filled with pus, its posterior wall being formed, to the extent of about a 25-cent piece, by cerebellar dura and sinus.

A fistulous passage leads from the cavity to the antrum, filled with granulations and epidermis masses. Between the granulations the incus is found with shortened processes, the malleus being absent. The labyrinthine wall is intact. The extradural abscess cavity is still more exposed toward the knee of the sinus. The sinus appears to be grayish-red and hard, and the dura presents a dirty grayish deposit. Plugging with iodoform gauze. Dressing.

During the first three days after operation the patient's subjective condition was good ; there existed slight irregularity of pulse and temperature, the latter varying between 35.9° C. and 37.5° C.

During the two subsequent days (on March 17th and 18th)—viz., on the fourth and fifth days respectively after operation—the temperature assumed a pyæmic character. Every rise took place without chill. On March 19th, therefore, the *jugular was ligated*. It could be found but with difficulty, since it was empty, and collapsed in form of a thin cord. In dissecting it out, it was incised lengthwise and bled from below—double ligature and cutting between. During the same narcosis the sinus was more exposed in both directions, and found to be covered with granulations. Incision of the sinus at the knee. Curetting of a soft, non-suppurating thrombus. Plugging with iodoform gauze.

After ligation of the jugular, the pyæmic fever continued ; it rose with chills and fell with profuse perspiration. Vomiting occurred before the first chill.

The frequency of the pulse markedly corresponded with the course of the temperature. The divergence of the pulse and temperature curves did not take place until shortly before the *exitus letalis*.

On March 24th, the background of the eye was examined for the last time, and found to be normal. From March 26th the sensorium was at times dull.

March 30th, icteric discoloration, and during change of dressing painful infiltration of the soft tissues, extending to the occiput, were noticed laterally at the neck.

The partly closed wound of the neck, therefore, was opened, whereby an abscess in the subcutaneous tissue was emptied. On

the following day (March 31st) intense somnolence, interrupted by deliria, set in, followed by the exitus letalis at noon.

Autopsy on April 1st (Dr. Ricker): Emaciated cadaver, icteric discoloration, abdominal integument not discolored, a few death spots. No œdema. Behind the ear and at the inner side of the sterno-cleido-mastoid muscle the operation-wound closed by plugs. Abdominal cavity, diaphragm, pericardium, and heart normal. The right pleural cavity contains 20 *ccm* of clear yellow fluid.

The left lung large and heavy, pleura at most places smooth. At the anterior side of the upper lobe in its centre a prominent area of the size of a nut, where pleura is covered with fibrin; somewhat lower down a smaller diseased area. At the edge between the two lobes, and also at the base and at several other places, thin fibrinous deposits. Upon transverse section both lobes appear quite vascular, without œdema. With the first-mentioned area corresponds an abscess of the size of a small pin-head, in the surroundings of which, to the extent of 1 *cm*, the pulmonary tissue is devoid of air, showing a hemorrhagic infarctus. Furthermore, in the upper lobe, there is found an abscess of the size of a pin-head, also with hemorrhagic surroundings. Bronchi with muco-purulent contents; arteria pulmonalis empty.

Right lung larger and heavier than the left. Pleura smooth. Upper lobe with diseased area, of the size of a hazel-nut, covered with fibrin. At several places fibrinous deposits. Upon the transverse section both lobes quite vascular, slightly œdematous, upper and lower lobes moderately pneumatic, corresponding to the diseased area in the upper lobe; there is a *group of abscesses of the size of pin-heads with hemorrhagic surroundings*. In the lower lobe at the anterior side an area of the size of a millet-seed of the same character; bronchi with mucous contents, mucous membrane quite vascular and smooth. Pulmonary artery contains clots.

Spleen enlarged from two to three times its natural size, serosa smooth; moderately vascular upon transverse section.

Fat capsule of left kidney moderately developed; surface and transverse section pale; icteric discolorations marked.

Right kidney more vascular, cortex pale. Duodenum with dull contents. In the stomach towards the cardia a place of the size of a palm with hemorrhages and extreme injection.

Liver large. At ileum near valve, several calcified glands. In the beginning of cœcum and colon a number of pigmented follicles.

After the removal of plug at the inner side of the sterno-cleido-mastoid, a cavity of the size of a walnut with purulent deposits and purulent surroundings. The jugular is exposed and opened below the place of operation. It contains a clot with a fibrinous layer at the surface. The entire clot is somewhat softened, discolored, and continues downward into the subclavian. The jugular stops above with rounded end. One cannot enter the wound cavity from the jugular with the probe.

In the wound cavity farther upward a ligature is met, which, when incised, presents above the continuation of the jugular. Description follows later on.

The other wound cavity (behind the ear) is at first limited by soft tissues, then by bone, and leads far inward. Abscesses thence extend downward, partly in the sterno-cleido-mastoid, to the level of the cricoid cartilage, and also some are found in the neighboring lymphoid glands.

In the posterior cerebral fossa there are a few *ccm* of clear fluid. The dura of the base is not very vascular, is smooth and moist. In the posterior two-thirds of the right transverse sinus clotted blood. In removing the dura at the posterior side of the right petrous bone, a defect of the size of a quarter is exposed in the bone, which leads outward into the other operated cavity. The dura is here transformed into a thick layer of cicatricial and granulation tissue and thus limits the cavity toward the rear.

The lateral sinus cannot be found at this place ; it ends in the fibrous tissue near the thickened portion of the dura.

The carotid is unchanged ; from the above-mentioned place of ligature of the jugular upward, a thickened vessel takes its course, corresponding in its position with the jugular, embedded in suppurating tissue, the inner surface of the vessel being covered with a red, partly softened thrombus ; the masses of the thrombi can be readily separated from the wall.

After removal of the petrous bone, the suppuration is seen to extend to the foramen occipitale magnum ; the purulent infiltration of muscular and fatty tissue reaches anteriorly the pharynx ; also in front of the vertebral column, in the region of the upper cervical vertebræ, the muscles and connective tissue are intensely suppurating.

The pia of the cerebellum is not vascular and without œdema, that of the convexity more so and œdematous. The lateral ventricles of corresponding width with clear fluid. Ependyma un-

changed. The choroid plexuses of a medium amount of blood, also unchanged. Third and fourth ventricles like lateral ventricles.

Cerebellar and cerebral hemispheres pale, of quite firm consistence, also central ganglia. Pons and medulla free.

The petrous bone, removed with surrounding parts, presented the following condition :

The incision made at the knee of the sinus was situated quite far forward, not at the lateral wall of the sinus. Above the place of incision, toward the cerebrum, the sinus is obliterated by an organized thrombus. The place of incision extends heartward into a defect in the sinus wall which reaches the foramen lacerum.

The defect is situated in the part of the sinus wall opposite the bone and is here connected with a place, at which the dura is detached from the bone by pus to the extent of a bean. This extradural abscess extends into the jugular fossa, where it completely compresses the bulb, below which the jugular, as far as the ligation, is filled by a discolored thrombus, and the wall is in one place perforated by ulceration. This thrombosed half of the jugular is surrounded by several periphlebitic abscesses.

Remarks : The most remarkable feature of this case is the extension by starts of the infectious thrombosis. The internal jugular at the operation was found to be completely collapsed and so thin as to cause doubts as to its real presence. In further exposing the vessel, a longitudinal incision presented the lumen and caused a slight hemorrhage from below, viz., against the direction of the blood current. When, after the double ligation and the cutting through the vessel, the lateral sinus was opened in the sigmoid fossa, a parietal thrombus was found. The autopsy revealed the fact, however, that the portion of the jugular from the collapsed place of severance in the direction of the heart, also contained a discolored thrombus, which extended into the vena subclavia.

This thrombus, situated far away from that in the sinus, and separated by the complete collapse of the middle portion of the jugular, and by the double ligation and cutting through the vessel, was probably in existence at the time of ligation and division. The ligation toward the cerebrum could not prevent the further transportation of infectious material into the blood current.

How may this periodic extension of thrombosis have been caused? The sinus wall was first diseased, where it was contiguous with the suppurating bone. Could a remote place of the inner wall of the jugular have been infected by micro-organisms circu-

lating with the blood current, or could germs originating in the sinus migrate through the jugular and heart, in order to remain retained in the small nutritive vessels of the veins (the vasa vasorum) and thus produce an embolic metastasis in the jugular wall with subsequent thrombosis of this vein?

30. Pyæmic fever in bilateral otitis from measles. Recovery without operation.

E. Bruno, four years old, was sent to the clinic on May 23, 1900.

History: Six weeks before admission the boy was seized with measles. After a week, both ears began to discharge profusely without preceding pain, the cervical lymph glands swelled considerably, and the urine contained albumen. For ten days there existed intermittent fever (in the morning mostly 36° C., in the evening 40° C., and more in the rectum). Chills and perspiration were missing. The boy was rapidly emaciating.

Condition on admission, on May 23d: Extreme emaciation and pallor. Tongue with gray coating. Background of eye normal. No paralysis of facial. At the neck small glands can be felt at different places. In both jugular regions no cords are present. Both external jugulars equally filled. All joints free. Heart and lungs normal. No albumen in urine. Spleen not palpable. Temperature (in recto) at noon, 37.0° C., at 8 P.M., 40.3° C. Pulse regular, accelerated. Sensorium free. No pain. Palpation and percussion of both mastoids reveal normal conditions. Right membrana tympani whitish, lustreless, and thickened, malleus not discernible. **Paracentesis** brought forward nothing: no pus, not even blood. The left membrana tympani covered by scanty pus. After syringing the external meatus a perforation of the size of a millet seed presented itself anteriorly and below, and a bulging posteriorly and above, which bled when incised. Gauze strips in both external meatuses; dressing.

May 24th.—Temperature normal. Right external meatus dry. Gauze strip in left meatus moistened by scanty sanguinolent discharge; no pus.

May 25th.—Temperature, at 8 A.M., 36.8° C., at 2 P.M., 39.8° C., at 10 P.M., 37.2° C.; on May 26th at 4 A.M., 35.6° C.; highest temperature on this day, 36.9° C. The rapid rise of temperature on May 23d and 25th ensued without chill, the fall without perspiration.

From now on, uninterrupted normal temperatures were present. The strength and general condition rapidly improved and the suppuration of the middle ear did not return. The patient was discharged on June 8th.

On June 13th the boy returned to the clinic on account of fresh pain in the left ear. He had no fever. At the extreme end of the left external meatus stenosis, sensation upon pressure, caused by diffuse swelling, in the meatus some watery fluid, slight œdema in the auricular fold; evidently an otitis externa. The ear was syringed with a solution of sublimate (1:1000), a gauze strip saturated with a two per cent. solution of carbolic acid was loosely introduced, and a protective dressing applied. The next day the œdema had disappeared from the auricular fold and the green color of the gauze strip revealed the pyocyanus as the causative agent of the external otitis.

Plugging of the meatus with a five per cent. solution of nitrate of silver cured this additional infection in two days.

Remarks: It cannot be decided whether there existed pyæmia due to osteophlebitis in the petrous bone, to marginal or even occluding thrombosis of a sinus contiguous with the petrous bone, since the patient was cured without operation. For the following reasons no operation of the petrous bone and sinus was considered: The suppurations of the middle ear had been on the decrease when the patient came to the clinic; there was no sign of disease in the petrous bone, none of metastasis; finally a lack of knowledge which ear had caused the general infection. The omission of the operation was justified by the favorable course.

31. Acute osteomyelitis of the pyramid of the petrous bone with retropharyngeal abscess by gravitation and extradural abscess upon the pyramid of the petrous bone. Several operations. Recovery.

Sch. Johann, forty-eight years old, at the end of September, 1898, was seized with intense pain in the left ear, which extended over the entire left half of the face. Simultaneously there was extreme deafness and continuous beating in the left ear. About a week previously the patient had contracted a severe cold, manifesting itself by considerable stupor and coryza. There was no otorrhœa.

His physician ordered for the "neuralgia" inunctions about the

aural region and neighborhood, and syringing the ear with chamomile tea.

The pain, however, increased, so much as to impel the patient to come to the aural polyclinic of Rostock on January 27, 1899.

There was bulging of the left membrana tympani. By paracentesis pus was liberated, and the pain decreased.

Fresh pain appeared in a week. February 2d the patient returned. Another paracentesis of the closed membrana tympani let out little pus. No fever. Admission to the clinic.

February 5th.—Sagging of posterior wall of external meatus. Integument of mastoid process normal.

February 7th.—**Chiselling of mastoid.** Condition: A few mastoid cells and the antrum contain a good deal of muco-pus and granulations. Bone yellow, cortex intensely sclerotic and the deeper layers softened at some places.

March 3d.—The operated wound was closed, except at a small cavity. Since February 18th the external meatus had remained dry. There occurred another bulging of the membrana tympani; upon **paracentesis**, suppuration. In spite of good drainage of the tympanic cavity, the patient still complained of intense beating in the ear.

March 12th.—The granulating bone wound was scraped as far as the antrum—without anæsthesia. In spite of this interference the wound did not show any tendency to heal.

On April 15th, under chloroform, **another thorough scraping and enlargement of the bone cavity and its softened walls** were done. The effect of this operation was not as desired. The wound did not close, and discharged numerous masses of tenacious mucus, which contained but a few pus corpuscles. In the beginning of May the patient had to be discharged to his home.

On June 19th he returned, complaining of beating and pain in the ear. From the fistulous opening behind the ear profuse purulent discharge. A great deal of pus also in external meatus. Temperature, 38° C.

Operation on the same day. Curved incision through the scar in which the fistula was situated. The granulations of the fistulous track leading to the antrum are soft and bleed a good deal. Antrum filled with granulations and pus. The granulations look lardaceous. Bony walls of cavity softened. The bony spur, remnant of the posterior wall of the external meatus,

was removed with cutting forceps as far as the tympanic cavity, which was scraped out. It contained many lardaceous granulations. Malleus and incus were loosened from their connections, but otherwise unchanged.

June 20th.—Temperature 38.8° C. Headache in frontal region, particularly in the evening. Change of dressing. After removal of plug, all at once about a teaspoonful of pus was discharged from the tympanic cavity.

June 21st.—Temperature 38.1° C. Change of dressing. After removal of plug the same amount of pus as on the day before. In wiping it away with cotton, it was seen to proceed from the *postero-inferior portion of the tympanic cavity behind the ridge of the facial*. Probing of this place reveals rough bone. Pulse 66, regular, in the evening 72. Headache less than yesterday. Background of eye normal, and also function of eye muscles.

June 23d.—Temperature, 36.8° C. Nausea, no vomiting, no disturbance of sensorium; pain in posterior half of the pharynx, where there is nothing manifesting itself distinctly. Slight horizontal nystagmus on looking to the right. Pulse, 50.

June 24th.—**Operation :**

First an attempt was made to enlarge with a sharp spoon the fistulous passage behind the facial ridge, from which pus wells out. After a lateral passive movement of the head much pus escaped through the fistula. Close above the posterior edge of the bony wound, the middle cerebral fossa was opened, the bony bridge between the normal dura exposed at this place and the original bone cavity was chiselled off and from that place the middle and posterior cerebral fossæ at the crest of the petrous pyramid were laid bare. The sinus was exposed about $1\frac{1}{2}$ cm in length, the middle cerebral fossa in an area of almost the size of a quarter. Dura and sinus normal. There was considerable hemorrhage from an emissary vein.

The day after the operation (June 25th) no stupor, no crossed pareses. In changing the dressing, discharge of pus as before.

On deglutition, pain in pharynx and occiput. No swelling externally at the neck or in the pharynx.

June 26th.—The same conditions.

June 27th.—Icterus.

Paresis of left abducens, with corresponding double images. In looking to the extreme right, nystagmus-like twitchings.

Pupillary reaction and ophthalmoscopic condition bilaterally normal.

Now marked swelling upon the left posterior pharyngeal wall.

In the tympanic cavity, the probe enters now quite anteriorly. As above at a depth of about 1 cm, a bone fistula, with rough walls, upon the careful removal of which profuse suppuration ensues.

Upon incising the swelling of the pharyngeal wall, pus escapes.

June 30th.—The place of incision of the pharyngeal abscess is enlarged ; profuse discharge of pus.

From the fistulæ of the petrous bone less pus is discharged than during the previous days.

July 3d.—The amount of pus from the bone cavity, as well as from the abscess cavity of the pharynx, has considerably decreased. Background of eyes normal. Paresis of abducens still persists.

July 16th.—The pharyngeal abscess was healed, the paresis of the abducens had disappeared, and the bone wound was covered with healthy granulations, discharging scantily.

July 22d.—Secondary **otoplasty**, according to Stacke, was performed.

Epidermization of the cavity was completed November 22d.

L, whispered voice perceived directly in front of ear ; tuning forks from the vertex only in R E.

Re-examined beginning of January, 1900 : scar as before.

Remarks : The symptoms of the described case are those of an acute otitis media, which had begun at the end of December, 1898, and, on account of paracentesis performed too late (about five weeks after the beginning of the otitis media), had led to mastoiditis and *osteomyelitis in the spongy neighborhood of the labyrinth and in the pyramid of the petrous bone,*¹ and, as final complication, was followed by the formation of an extradural abscess above the apex of the pyramid of the petrous bone, and by a retropharyngeal abscess by gravitation.

The osteomyelitis in the spongiosa of the pyramid of the petrous bone is proven by the fistulous path which led from the posterior and anterior portion of the tympanic cavity into the pyramid of the petrous bone. The large amounts of pus emanating from these fistulæ could not

¹ Such cases were first described by Habermann. Compare Koerner, *The Purulent Diseases of the Petrous Bone*, p. 40.

alone originate from the diseased bone. That quantity which was emptied during a passive movement of the head from the posterior fistula of the pyramid could have originated from an abscess by gravitation in the deep cervical muscles. The abundant quantities which originated from the *anterior fistula of the pyramid* must have emanated from an *extradural abscess upon the apex of the pyramid* of the petrous bone. This view is supported by the simultaneous paresis of the abducens, which rapidly disappeared after the removal of the pus from this place.

32. *Otitic purulent leptomeningitis and extradural abscess in the posterior cerebral fossa.* Extension of pus through the ductus endolymphaticus and the hiatus subarcuatus. Granulations upon the sinus without changes at the intima of the sinus. Autopsy.

Hermann, fifteen years old, suffered for ten years repeatedly from otorrhœa of the left ear, the cause of which could not be ascertained.

Six years ago, Dr. S. who now (on June 27, 1900) transferred the patient to the aural clinic, had performed an operation behind the ear. According to the report of the parents, there existed at that time a swelling behind the ear.

The patient has complained for a week of pain in the left ear without suppuration. Intense vertigo persists for four days. Two days ago, vomiting occurred followed by a chill, which was said by the relatives to have lasted a quarter of an hour. The hearing of the left ear is said to have been lost for years. A diminution of hearing in the right ear had been noticed by the patient but a few days ago.

Present condition at the admission on June 27th :

Extremely robust, well nourished young man. Sensorium free. Gait unsteady, dragging. Pulse 84, regular, strong. Cardiac sounds clear. Lungs normal. Patellar and cremasteric reflexes missing. Abdominal reflexes present. No pareses of upper and lower extremities. Both facials intact.

Behind the left ear a scar from operation, which, as well as the remaining soft tissues covering the mastoid, does not exhibit any inflammatory signs. Here no painfulness upon pressure.

Left membrana tympani reddened, dull, apparently not perforated. No pus after incision, but profuse hemorrhage. Right membrana tympani normal. Hearing of left ear apparently lost ; that of right ear much reduced.

Background of eye normal. Moderate nystagmus in looking to the right. Urine free from albumen.

After admission, vomiting occurred twice. The temperature, taken every two hours from 9 A.M. until 5 P.M., varied between 39.4° C. and 39.7° C. The patient complains of headaches and pain in gluteal region, where a place was found to be painful upon pressure, but otherwise unchanged. In the afternoon slight stupor.

In the supposition of a labyrinthine suppuration, either with beginning meningitis or with septic general infection, the operation was performed at 5.30 P.M. Radical operation according to Zaufal; plastic delayed.

After two chisel strokes, about 1 cm behind the spina supra meatum, a tablespoonful of pulsating, offensive pus oozes out mixed with white scaly shreds.

With rongeur and chisel the extremely sclerotic external wall of a large cavity filled with the above-mentioned masses and granulations is removed. The cavity extends into the antrum. In the tympanum granulations, no white scales; ossicles not found.

At the inner wall of the antrum a cavity of the size of a pea, above smooth, below sinuous, filled with granulations, which is enlarged with chisel and freed from the granulations. At the wall of this cavity two tiny circular openings are seen.

The above-mentioned scale-like masses extend posteriorly and outwardly to the sigmoid sinus, which is fully covered with granulations. The sinus and the portion of cerebellar dura located medially are fully exposed. Dura studded with blackish granulations. Region of sinus pulsating, sinus easily compressed, but refills itself upon relaxation of pressure. After operation and during the night patient quite restless.

On June 28th, opisthotonus.

Questions are answered by patient with indistinctly pronounced, incoherent, irrelevant words. In quiet moments conjugated deviation to the left is observed.

In the afternoon extreme restlessness. Jactations and hallucinations. Pupils enlarged, not reacting upon light. In the evening marked opisthotonus.

June 29th.—Extreme opisthotonus. Upper lip covered with a dense cluster of herpetic vesicles. Incontinence of urine. Constipation. Difficulty in swallowing. Margin of optic disc indistinct. At midnight exitus letalis.

Autopsy of head, June 30th, nineteen hours after death :

Cranium with bluish transparent diploë. Upon dura of convexity numerous blood drops. All vessels of dura and pia extremely filled. Pia of convexity œdematous, containing dull fluid in some of the meshes. Upon either occipital lobe under meshes of pia filled with muddy fluid, one abscess each of the size of the head of a pin, in the cerebral cortex. Region of chiasma nervi optici, pons, and medulla with purulent deposits. Pus also in the beginning portion of both Sylvian fissures. No pus in porus acusticus internus. Brain substance of good consistency with many hemorrhagic spots, without diseased areas. No sinus contains thrombi. The left sigmoid sinus, even where it is externally covered with thick granulations, is internally smooth and reflecting. Medially from sigmoid sinus, dura discolored (blackish olive green and viscid) and perforated. The centre of the discolored place is occupied by the equally discolored saccus endolymphaticus, the two sheaths of which are partly ulcerated.

From the removed petrous bone the dura is first loosened and then with the fret-saw separated about frontally in the direction of the external meatus, whereby the facial canal is transversely cut at the inner wall of the tympanic cavity, and the vestibule and cochlea are opened. Pus in vestibule. No pus in facial canal or in cochlea. The stapes plate is preserved *in situ*. The cavity at the inner antral wall is situated above the horizontal semicircular canal and extends anteriorly to the vestibule, without communicating with it. After macerating the bone by boiling in diluted liquor sodæ, it is seen that one of the tiny circular openings in the wall of this cavity leads directly into the hiatus subarcuatus. The remaining openings are small recesses.

Remarks : From the history and an observation lasting but a few hours, a labyrinthine suppuration could be diagnosed with great probability. The preceding dull, and the high continuous fever during the hours of observation further indicated an infection exceeding the limits of the petrous bone, without signs for a positive recognition of its character and location. It could be meningitis or general sepsis. Positive signs of meningitis were not present.

Lumbar puncture could have positively settled this question. Since this procedure is, according to our experience, by no means without danger in intracranial diseases, and also,

according to Jansen's experience, *beginning* purulent meningitis may still be cured after thorough removal of the primarily diseased area, we could not lose any time and immediately searched for the suppurating area in the petrous bone. If we were too late, we could hope to lessen the patient's pain through an operation.

The operation exposed among other lesions a cavity with granulations at the inner antral wall. Several circular openings, which could have been partly considered as opened semicircular canals, led into this cavity. The destruction at the inner wall of the antrum deprived us of the possibility of positively ascertaining the conditions present. The autopsy of the petrous bone, however, exhibited two paths through which the pus could have made its way into the cranial cavity, although we could not positively ascertain through which it had travelled. The destruction of the saccus endolymphaticus and the suppuration in the vestibule favor the view of propagation through the endolymphatic duct, the communication between the osseous cavity and the hiatus subarcuatus that of propagation through this chink. The pus may have used both pathways.

A PERSONAL EXPERIENCE OF AN ACUTE ATTACK OF AUTOPHONY.

BY DR. HERMAN KNAPP.

AUTOPHONY, as a mild and transient symptom of pharyngitis, is probably not rare. I myself, at least, have felt it occasionally, and always could make it disappear instantly by drawing the air back from my ears while keeping nose and mouth closed (negative Valsalva).

During the unusually hot and humid weeks in July, 1900, which I passed partly in New York City, partly on the New Jersey sea-coast, I had an acute attack of autophony, which lasted several weeks and was so pronounced and characteristic that I thought a description of it might be read with some interest. Being reduced in flesh by an acute summer diarrhœa, but otherwise in good health and pursuing my ordinary occupation, I first noticed a strange stiffness in the walls of the naso-pharyngeal cavity, which appeared swollen and red as in an ordinary mild case of pharyngitis. The feeling was limited to the soft palate and the posterior and lateral walls of the pharynx, *i. e.*, the mouths of the Eustachian tubes and their surroundings. This cavity felt obstructed, and its walls, in particular the soft palate, stiff, starched, as if infiltrated with some hardening substance. I had the desire to free the cavity from supposed clotted mucus, but all my hawking and blowing was in vain. This condition lasted four or five days, then I grew somewhat hoarse, but my nasal respiration at the time and during the whole attack was free and there never was any discharge.

Then I noticed that repeatedly during the day the inspired air would rush into my right ear, and cause a feeling of fulness and enforcement of sound, words spoken by others and my own voice

were louder and produced an unpleasant vibration in the ear. In drawing the air back while holding nose and mouth closed, the phenomenon at once disappeared.

These attacks repeated themselves more or less frequently during a week. They were at times in the right, at times in the left, and at others simultaneously in both ears, but I could always control them by the negative (reversed) Valsalva's experiment.

In the third week the attacks were more frequent, mostly binaural, longer, and quite distressing, and I could not make them disappear any more by negative Valsalva. One evening I had to talk with a friend for two hours. All that time my ears were filled with air; the attack was at its height. The inspiratory current passed from the nasal passages directly, unimpededly, and painlessly into the lungs, but filling both ears on its way. I felt the rush of air distinctly through the tubes into the tympanic cavities, but no farther back. The striking of the air against the drumhead and the other walls of the drum produced a sonorous, somewhat whirling sensation, with no gurgling or any other sound. I was breathing not only through my nose, but also through my ears. My own voice was harsh and louder, that of my friend the same, but muffled, not so well defined. I might compare it to a microscopic specimen, magnified by a strong eye-piece, being larger, but lacking definition. This state of affairs lasted a week, then it rapidly came to an end when cooler weather set in and my health was restored. In a week I gained nine pounds in weight. The autophony has not returned since—six weeks.

During its presence I could make it instantly disappear, at first by (reversed) Valsalva, but later only by stooping or lying down. When I was in bed I always was free from it, the same when I was in the ocean, swimming or floating, and also when standing. In the mornings I did not suffer from it much—temporary spells could be at once cut short by reversed Valsalva or stooping; but in the afternoons, especially in the evening when I was tired, and more so when there was company, it was most distressing. I had no increase of temperature, my hearing was not impaired, my drumheads, which were examined by an aurist, showed no change. The walls of the naso-pharyngeal cavity were red, somewhat swollen, but there was no discharge during the whole attack.

Reviewing the case, it appears that the symptom of autophony was preceded by moderate hyperæmia, swelling,

and stiffness of the walls of the pharynx, extended in a mild degree also to the larynx. At the beginning, the autophony was only in one ear, then in both; at first in short attacks controllable by negative Valsalva or stooping, later lasting a few hours together, not relieved by negative Valsalva, and by stooping only as long as the head was thrown down. When the body was in the horizontal position it always disappeared. It caused no disturbance at night. There was no otitis connected with it. It was mild in the morning, most distressing in the afternoon and evening. It was produced by congestive pharyngitis in a system reduced and weakened by a violent attack of summer diarrhœa. Its mechanical cause was a patency of the Eustachian tubes, their easy closure being impeded by the rigidity of their walls, especially the membranous. The whole complaint was recovered from, without any treatment, as soon as the weather and the condition of the patient had changed for the better.

The text-books of otology devote but little space to the symptom of autophony. Politzer mentions it among the symptoms of secretory middle-ear catarrh (3te Auflage, 1893, S. 222). He says: One of the most distressing symptoms is the resonance of one's own voice—autophony. It disappears during treatment and rarely outlasts the recovery for a longer time. Jacobson, in his text-book (2d ed., p. 97, 1897), and especially Ostmann, in Blau's excellent *Encyclopedia of Otology* (1900, S. 40), give good descriptions of it. An elaborate article, with five cases and a full discussion of the subject, by Brunner, is published in these ARCHIVES, 1883 (Germ. ed., *Zeitsch. f. Ohr.*, vol. xii., pp. 268-282, Engl. ed., xii., p. 238, "The Etiology and Symptomatology of Autophony"). He refutes, or rather modifies, the theory according to which not only patency but also obliteration of the tube may produce autophony. It is not my purpose to repeat and discuss these arguments; all I wanted was to offer to our readers a singularly pure example of this rather strange affection.

REPORT ON THE PROGRESS IN OTOLGY DURING THE FIRST QUARTER OF 1900.

BY DR. ARTHUR HARTMANN.

Translated by Dr. ARNOLD KNAPP.

ANATOMY OF THE EAR.

1. HAMMERSCHLAG. The origin and growth of Corti's membrane. *Verhandl. des physiol. Clubs zu Wien*, Jahrg. 1899-1900.

2. KEIBEL, F. Embryology of the labyrinthine appendix (Recessus labyrinthi or ductus endolymphaticus). *Anat. Anzeiger*, vol. xvi., No. 19.

3. RAWITZ, B. The auditory organ of the Japanese dancing mouse. *Arch. f. Anat. u. Physiol.*, Jahrg. 1899, Nos. 3 and 4.

4. GRUBER, J. A case of dehiscence at the lower wall of the bony external canal, with appearance of the jugular bulb in the aperture. *Monatschr. f. Ohrenhkk.*, 1900, No. 1.

1. According to HAMMERSCHLAG, Corti's membrane is composed of delicate fibres, which arise from the epithelium of the embryonal cochlearis, especially from those cells which later invest the limbus spiralis. The connection between Corti's membrane and terminal frame of the reticular membrane as Retzius has described it, probably persists through life. KRAUSE.

2. In the chick, the ductus endolymphaticus is not a protrusion of the auditory vesicle as in the amphibia but is identical with the stem of the auditory vesicle and communicates externally at a certain time of embryonal life. It is therefore very probable that the ductus endolymphaticus is homologous to the canal which forms an external communication of the labyrinth in the Selachia.

KRAUSE.

3. RAWITZ found total deafness to exist in these animals, which turn continually like a top. The nervous unrest is thus explained. The circular canals are very much changed; the posterior and the external ones are deformed. The utricle is quite irregular and communicates freely with the saccule. The former opens deep in the scala tympani. The auditory cells of Corti's organ are degenerated. "The conditions found to exist in the dancing mouse oppose the existence of a static sense." The circular canals are the seat of the faculty of orientation.

KRAUSE.

4. The defect measured 6-7 mm by 3-4 mm. The skin of the canal covered the defect, but was so thin that the bulb of the jugular vein was visible. This area protruded on pressure exerted on the int. jugular vein. GRUBER has a specimen showing a small opening at the same place.

KILLIAN.

PHYSIOLOGY OF THE EAR.

5. SCHAEFER. A new explanation of the subjective combination tones based on Helmholtz's hypothesis of resonance. *Arch. f. d. gesammte Physiol.*, vol. lxxviii.

6. MARAGE. The function of the buccal cavity and the ventricles of Morgagni in the formation of voice. *Arch. internat. de laryng., d'otol.*, etc., vol. xiii., No. 1.

5. SCHAEFER discusses the question, "Do vibrations and tone interruptions produce a tone sensation?" in a critical review of the existing theories, and locates the objective origin of the subjective combination tones in the labyrinth, and not in the drum membrane, like Helmholtz.

BRÜHL.

6. MARAGE succeeded in making models of the shape of the buccal cavity during the pronunciation of the different vowels. He made resonators on these patterns, and with aid of König's flames produced more exact optic pictures than heretofore. These pictures were then photographed. These resonators have diverticula corresponding to the sinuses of Morgagni, which are important, according to the author, in the production of the clang tint. The resonators are to be employed in the instruction of deaf-mutes.

SCHWENDT.

GENERAL.

a.—REPORTS AND GENERAL COMMUNICATIONS.

7. BLOCH. The relation of otology to the other medical sciences. Jena: Fischer.

8. GRUNERT. Historical note on the relation of otology to rhinology. *Arch. f. Ohrenhkk.*, vol. xlviii., p. 281.

9. VILLARET. Ear disease in the German army. Supplement, *Deutsche militärärztl. Zeitschr.*, 1900, p. 25.

10. STETTER. Experiences in the affections of the ear, nose, and throat. *Monatschr. f. Ohrenhkk.*, 1900, No. 3.

11. LARIONOW. Examination of hearing in the insane. *Medicinskoje Obosvenje*, Dec., 1899.

12. LJURI. Qualitative and quantitative examination of hearing in school children. *Wratsch.*, Nos. 39-43, 1899.

13. JANKELEVITSCH. On the frequency of deafness in children, its causes, effects, and curability. Bordeaux, 1899.

14. NEW YORK EYE AND EAR INFIRMARY. Seventy-ninth Annual Report, for the year ending September 30, 1899. Aural Surgeons: Bacon, Dench, Adams, Whiting, McKernon.

15. MANHATTAN EYE AND EAR HOSPITAL. Thirtieth Annual Report, for the year ending September 30, 1899. Aural Surgeons: Roosa, Pomeroy, Webster, Emerson, Hepburn.

16. NEW YORK OPHTHALMIC AND AURAL INSTITUTE. Thirtieth Annual Report, for the year ending September 30, 1899. Aural Surgeons: H. Knapp, Töplitz, Coburn, A. H. Knapp, Jordan.

7. BLOCH gives a history of otology in Freiburg. The advances made in otology by aid of anatomy, physiology, surgery, and pathology are described. "Otology is the science of a physician and not the profession of a technician." A final plea is made for admission of otology to examinations and that internal medicine in future will pay more attention to the ear.

BRÜHL.

8. GRUNERT takes issue with a statement made by an editor of a periodical that it is owing to rhinology and pharyngology that otology has become a fertile field. Otologists like Yearsley, v. Trölsch, W. Meyer, and Voltolini, to speak only of the dead, have been the chief promoters of rhinology and pharyngology,

and a surgeon, and recently an oculist have contributed to the advancement of the surgery of the accessory nasal sinuses. Grunert humorously admits, however, that the modern endonasal over-activity has produced many ear patients and has thus enlarged our aural operative field.

BLOCH.

9. VILLARET adds to his previous publication that in the army most cases of disease of the external ear and drum occur in July; 40.5 per cent. of all diseases of the external ear and drum occur in June and July. This striking frequency is due to the injurious effect of bathing. Diving especially causes many cases of rupture of the drum, often with severe subsequent otitis media. Villaret thinks that diving should not be permitted.

KÖRNER.

10. The report contains the description of a case of carcinoma of the lobule following a penetrating wound.

KILLIAN.

11. LARIONOW's investigations were made in Bechterew's clinic. Psychical diseases, especially those commencing with auditory hallucinations, are often associated with disease of the ears. The ear, nose, and naso-pharynx should be carefully examined and treated, whereby psychic disease can more readily be cured. An interesting fact brought out by the author is that in the diseases beginning with marked psychical defect, as the secondary insanity or dementia, the musical faculty of the cerebral cortex remains intact. It is therefore probable that a particular centre for the musical faculty exists in the cerebrum.

SACHER.

12. LJURI examined carefully 300 children of both sexes with the following results: 1. In $\frac{1}{3}$ of the school children between eight-fourteen years old hearing for whisper was 30 metres, and in $\frac{2}{3}$ it was more than 20 metres. 2. 18 per cent. of the 300 children must be regarded as hard of hearing, as a minimum hearing distance for whisper is 15 metres. 3. The lower tone limit in school children is situated between C II and E II. 4. The upper limit is between 0.1 and 0.2 of the Edelman-Galton whistle. 5. Bone- and air-conduction in children with normal hearing organs within 7 octaves is not shortened. 6. Rinne's test must be positive. 7. In Weber's tests the answers are contradictory. 8. Impissated cerumen occurs more frequently in girls. 9. Crescentic opacities of the drum, passing from the short process down and back, are frequently seen in children who have had measles. 10. Deposits of lime are rare in school children. 11. Otorrhœa was present in 5 per cent. 12. Adenoids in 27 per cent.; of these

‡ were likewise affected with middle-ear troubles. The other observations are not new.

SACHER.

13. JANKELEVITSCH dwells upon the frequency of deafness and regrets the retarded seeking of medical help. The statistical tables of Bezold, Gellé, and of Moure are used.

Moure found among 3588 school children that 17 per cent. do not understand loud conversational voice at 5 metres. According to Moure a normal ear should comprehend a loud dictation at 10 metres.

The reviewer has also come to the conclusion that examination of school children with the whisper voice of Wolf or Bezold or with acoustic instruments is not practicable, and recommends Gellé's method (writing down of a loud-spoken dictation). This method takes the least time and is capable of determining whether the pupil can pursue his studies or not.

SCHWENDT.

14. Number of patients, 8362 ; operations, 1065 ; paracentesis of membrana tympani, 320 ; ossicectomy, 19 ; opening of mastoid cells, 186 ; Stacke operation, 3 ; operation for thrombosis of sigmoid sinus, 6 ; for thrombosis of jugular vein, 2 ; for epidural abscess, 19 ; for cerebellar abscess and excision of internal jugular vein, 2 ; removal of adenoids, 152 ; removal of granulations and polypi from middle ear and auditory canal, 260.

15. Number of ear patients, 3251 ; throat patients, 3198 ; ear operations, 257 ; operations on nose and throat, 1000 ; opening mastoid cells, 67 ; opening lateral sinus, 2 ; paracentesis of membrana tympani, 22 ; cerebral abscess, 2 ; removal of granulations and polypi, 39 ; ossicectomy, 2 ; operations for adenoids, 444.

16. Number of ear patients, 1245 ; of nose patients, 1686 ; operations, 529 ; removal of granulations and polypi, aural, 35, nasal, 27 ; paracentesis of membrana tympani, 89 ; ossicectomy, 2 ; opening mastoid cells, 28, one exploratory in a child having serous meningitis (tubercular) ; incision for furuncle of auditory meatus, 19 ; removal of adenoids, 137 ; of faucial tonsils, 56.

J. B. CLEMENS.

b. — GENERAL SYMPTOMATOLOGY AND PATHOLOGY.

17. HALSTEAD, T. H. The significance of earache in children. *Med. News*, March 17, 1900.

18. EULENSTEIN. Diseases of the ear in diabetes. *Deutsche Arch. f. klin. Med.*, vol. lxvi.

19. CASTEX. Acquired syphilis of the ear canal. *Bulletin de laryng., otol., etc.*, May, 1900.

20. PIFFEL. Tuberculous otitis with tumor-like protuberance in the cranial cavity. *Zeitschr. f. Heilk.*, vol. xx.

21. HAIKE. Contributions to the pathology of the middle ear and labyrinth. *Arch. f. Ohrenheilk.*, vol. xlviii., p. 228.

22. LOHNBERG. A case of punctured wound of the ear with escape of cerebral fluid. *Münch. med. Wochenschr.*, No. 3, 1900.

23. ZERONI. On carcinoma of the ear. *Arch. f. Ohrenheilk.*, vol. xlviii., p. 141.

17. Conclusions : (1) Earache in children is generally caused by acute inflammation of the middle ear, suppurative or catarrhal. (2) Infants and young children may have suppuration in the middle ear without giving satisfactory evidence of pain, or without rupture of the drum-membrane. (3) In the absence of other known causes of pain, from which a child is suffering, the first cause to be thought of should be acute otitis media, and this calls for an examination of the drum-membrane. (4) It has been shown by examination of the middle ear, during life and post-mortem, that purulent otitis media is nearly always present in acute infectious diseases of the gastro-intestinal and respiratory tracts in young children, especially in gastro-enteritis and bronchopneumonia, to which diseases it probably stands in a causative relation. (5) The cause of death in many acute and chronic infectious diseases, in meningitis, and in the exanthemata, is the result of unrecognized and untreated abscess of the middle ear. (6) Repeated earaches in children are ordinarily but a sign of acute exacerbations of a chronic otitis media resulting from adenoids. (7) In adult life, so-called catarrhal or progressive deafness is often but a final stage of the otitis media which had its beginning in early childhood, when it was due to adenoids and practically curable.

J. B. CLEMENS.

18. EULENSTEIN refers to the frequency of diseases of the external canal in diabetes, and states that affections of the internal ear, as well as catarrhal processes of the tube and middle ear, are not especially influenced by sugar in the urine. The relation of purulent otitis media and diabetes are treated in detail. A careful review of forty-six cases of purulent otitis in diabetes mentioned in literature, one case personally observed, and three of Körner's, lead the author to conclude that there is no etiological connection

between diabetes and middle-ear suppuration. The rapid destruction of the mastoid process, which is regarded by some authorities to be characteristic for diabetic otitis media, may also occur in other general diseases, as influenza, pneumonia, scarlet fever, in which the resistance has suffered by the severity of the infection. The causes which may unfavorably influence the otitis in diabetes, and bring on severe complications, are : (1) the anatomical structure of the mastoid process ; (2) the favorable soil produced by diabetes for pathogenic agents of various kinds ; (3) the frequent arterio-sclerosis, inducing poor nutrition ; (4) the severity of the infection.

DENKER.

19. CASTEX has observed seven cases, and concludes as follows : Acquired aural syphilis occurs usually in man, wherein it differs from congenital syphilis. Prognosis is worse the earlier the aural symptoms appear after the chancre. The cases where the inner meatus is affected are unusually grave. Treatment is the usual one, combined with pilocarpin injections.

20. PIFFEL reports on the pathological anatomy of a temporal bone from a man, fifty-five years old, who suffered from cerebral atrophy, chronic pulmonary and bronchial gland tuberculosis, purulent bronchitis, lobular pneumonia, and chronic tuberculous otitis of the left petrous bone, and died in an insane asylum. No examination in the living had been made. The lining of the left external meatus was thickened, destroyed near the drum, and partly transformed into granulation tissue. The changes in the bone were very extensive. Almost the entire upper and posterior wall of the bony canal was wanting, the lower anterior wall presented a defect including the floor of the tympanum and exposing the maxillary joint. Drum, ossicles, tegmen tympani, and pars epitympanica were missing ; a granulation the size of a pea occupied the round window. Large defects in the mastoid process, and at the upper and posterior surface of the pyramid. On the destroyed tegmen tympani there is a tumor as large as a walnut, composed of dura, with many small nodules on the surface ; the dura on the posterior surface is 2 *cm* thick. The lumen of the sigmoid sinus, which is in places very closely connected with the proliferation, and the jugular bulb are obliterated. The cartilaginous part of the tube is unchanged ; the carotid contains fresh blood coagulum. Histologically the tumor shows a tuberculous structure ; miliary tubercles, giant cells, and tubercle bacilli were present. The inner tympanic wall was rough, covered with granu-

tation tissue, and contained lacunæ, filled with new inflammatory tissues. The process had passed through the two windows and the Fallopian tube to the labyrinth. The middle ear and cochlea also communicated by a canal at the floor of the cavity. The nervous end apparatus was destroyed, except a part in the upper turn; tuberculous granulation tissue replaced the vestibule, ampullæ, and circular canals. Miliary tubercles were found in the facial and acoustic nerves. The infection had passed by way of the Eustachian tube from the naso-pharynx to the tympanum, and the tegmen tympani to the dura, where it came to a stop.

DENKER.

21. Left-sided otorrhœa, following diphtheria in childhood. Radical operation. Wound healed in six weeks. At a later period a granulating point appeared on a semicircular canal, which enlarged and contained tubercle bacilli. The three ossicles were removed at time of operation in a single granulating mass, and all were found carious. There was new-formed bone at the stapes plate. According to the author, caries of the stapes plate is almost always tuberculous. In this case no other tuberculous focus was present.

BLOCH.

22. Punctured wound in the canal with hat-pin. Subsequent vertigo, vomiting, retardation of pulse, and moderate discharge of a serous fluid for about ten days. Perforation in the posterior upper quadrant. Recovery, with good hearing. LOHNBERG believes that the pin punctured the tegmen tympani, and opened the subarachnoid space.

SCHEIBE.

23. ZERONI relates five cases from Schwartz's clinic. Etiology, diagnosis, symptomatology, pathology, prognosis, and treatment are carefully discussed with aid of literature, from which 121 cases are collected. Four photographs are added.

BLOCH.

C.—METHODS OF EXAMINATION AND TREATMENT.

24. WAUNER. Diagnosis of one-sided deafness.

25. RÖHR. The physical determination of one-sided deafness. *Deutsche med. Wochenschr.*, No. 2, 1900.

26. LUCAE. The physical determination of one-sided deafness. *Deutsche med. Wochenschr.*, No. 7, 1900.

27. HUMMEL. The proof of one-sided deafness. *Deutsche med. Wochenschr.*, No. 7, 1900.

28. BONNIER. "La peinture acoumetrique." *Arch. intern. de laryng., d' otologie*, etc., vol. xii., No. 6.

29. MAHU. Examination of the ear in accidental stenosis of the canal. *Arch. intern. de laryng., d' otologie*, etc., vol. xiii., No. 1.

30. GRADENIGO. Radiograph of a bullet in the ear. *Archiv. ital. di Otologia*, etc., vol. ix., p. 237.

31. ZERONI. A new instrument to remove the incus from the canal. *Arch. f. Ohrenhkl.*, vol. xlviii., p. 191.

32. STILLSON, HAMILTON. Extension massage of the ossicles with a new aural masseur. *Journal American Medical Association*, Jan. 20, 1900.

33. OATMAN, E. L. New ear basin. *New York Medical Journal*, Jan. 13, 1900.

34. EULENBURG. A new instrument to apply vibratory massage. *Deutsche med. Wochenschr.*, No. 10, 1900.

35. PEWNIZKI. Ferripyrin in ear disease. *Wojenno medisniski Shurnal*, October, 1899.

24. One-sided deafness can be determined by Bezold's continuous-tone series; all previous methods are unreliable. The functional examination showed that the hearing range (apparent) of the ear without a labyrinth gave an image necessarily faulty of the hearing ability of the other side. Characteristic was: (1) that the lower tones to a' were not heard; and (2) that the values which were found for the hearing duration in percentages showed a gradual step like ascension from a' to fis' . In one case the ear without a labyrinth showed a hearing duration for a' of 12 %, for f' 20 %, for c' 29 %, for fis' 52 % of the normal hearing duration. Patients were selected for examination where one ear was deaf and the other normal, and where one ear was deaf and the other somewhat affected. It was found that the tones a' and f' , if the perception for these was reduced to 50 % of hearing duration, = 0.051 true hearing value of the better hearing ear, were no longer heard by the deaf ear, i. e., that they were not conveyed over to the other ear. That higher tones are not perceived by the deaf ear, but by the other closed ear is proven by the fact that certain tones are very much shortened or not heard at all by the deaf ear if they are heard for too short a period by the better hearing ear to be transmitted from the deaf ear, while other tones which are unusually long perceived by the hearing ear are

heard for an unusually long period by the deaf ear. Diagnosis of one-sided deafness depends on the following conditions :

(1) When speech is not heard and perceived as well in Lucae-Dennert's test with both ears closed as when the affected ear is open.

(2) When the lower tone limit is at a' or thereabouts.

(3) Weber's test with A and a' is lateralized to the sound ear.

(4) Schwabach's test proves negative, granted that no middle-ear process is present.

The most reliable points are furnished by (5) the test of hearing duration if the latter shows the above-described ascension and when certain tones are very much reduced on the good side and corresponding shortening or absence for the same tones on the affected side are noticed.

DENKER.

25. RÖHR has experimented with the interference otoscope of Lucae for the diagnosis of one-sided deafness, to verify the latter author's results. He has employed only intelligent persons and has followed Lucae's directions closely but was able but partly to confirm his results. A positive result was obtained but once,—increase of the tone on the sound ear in connection with the long tube when the short tube was placed in the deaf ear, while the vibrating tuning-fork, according to directions, was screwed tight in the horizontal branch of the T-shaped interference tube. The opposite was noted once. Of interest was the observation that a patient noticed an increase of tone in the left ear as soon as the short tube was introduced in the right one. According to Lucae the right ear should have been deaf, but the examination showed that both ears were equally and relatively good. NOLTENIUS.

26. LUCÆ criticises the above article and states that the C and not the A fork was used, and the long tube was 3 *cm* too long. Lucae claims that his method was only applicable for one-sided hardness of hearing or deafness for deep tones, and is perfectly reliable if properly applied.

NOLTENIUS.

27. HUMMEL has two persons speak into tubes tightly fitting in each ear. Short sentences of the same, similar, or quite different contents are spoken simultaneously and with the same intensity, and are to be repeated by the patient. The one-sided deaf will always repeat correctly while the simulator will not be able to separate the various impressions.

NOLTENIUS.

28. BONNIER endeavored to find a simple manner of recording the hearing tests, and had Collin make a tuning-fork of 100 v. d.

The method depends on the following physiologic optical facts : A tuning-fork, whose stem is held in the hand, is set in vibration so that the small surfaces of the branches are turned to the observer's eye, and the free surfaces turn in a quarter-circle. The picture of the fork when it ceases vibrating is a surface, while if vibrating striped in fan-shape. This is more noticeable if a shining metal needle is fastened to the metal branch. It is necessary to see how many seconds elapse after the time when fan-shaped stripes are no longer visible, and that point when the normal ear no longer hears the vibrating fork.

If, for example, a normal ear hears the vibrating tuning-fork for n seconds after the striped figure is no longer recognized by the eye, then the normal hearing is $+ n$ seconds. A perception which is less than this normal duration is pathological and either $+ n - m$ seconds or ± 0 , or equals $- n$ seconds.

This method may be combined with Gradenigo's, which was published at the last congress and consists in replacing the needle by a figure.

Another experiment of Bonnier's is to determine the hearing perception of a fork placed on the patella. Bonnier has thus been able to discover a beginning deafness in conditions where other methods failed. This has reference to diseases of the sound-conducting apparatus alone.

SCHWENDT.

29. It is usually very difficult to examine the drum in cases of stenosis of the external canal following eczema or furuncle. MAHU has had constructed an instrument (speculum dilatateur) to overcome this difficulty.

SCHWENDT.

30. In GRADENIGO's radiograph the projectile is seen next to the labyrinth wall near the carotid canal.

GRADENIGO.

31. This instrument is a disc of polished steel wire at right angles to the stem, which prevents the escape of the incus in the direction of the antrum. This incus is forced to the floor of the tympanum, whence it is then extracted.

BLOCH.

32. This instrument, which is minutely described, was devised to meet a requirement in which other masseurs were considered deficient. It is the means of putting anchyloses, or adhesive bands, on the stretch, while such anchyloses are being vibrated. Under its use tinnitus, not due to congestion, is quickly relieved, and the hearing distance, in suitable cases, increases steadily. In old and very chronic cases the application must be repeated for a

long time. It is found beneficial in cases hitherto considered hopeless.

J. B. CLEMENS.

33. This new basin designed by OATMAN has a hollow handle which projects above the bottom, acting as a trap. The solid matter is retained, while the overflow passes through the handle to any convenient receptacle.

J. B. CLEMENS.

34. This new modification of the old apparatus for vibratory massage consists of the interposition of an air-tight quantity of mercury which is set in motion by the rotating-waves and in turn gives a number of regulatable movements to the massage appliance.

NOLTENIUS.

35. Ferripyrrin, a combination of ferrun sesquichloratum and antipyrin is an orange-red powder soluble in water. PEWNIZKI has used this in forty-five cases, grouped in three classes according to the nature of the ailment. In the I. group there were fifteen patients, acute catarrhal and purulent perforative otitis; in II., eighteen cases of otitis med. purulenta chronica; and III., twelve cases where, besides the chronic discharge, granulations or polyps were present. Ferripyrrin was employed in 1-20 % watery solution, and dropped into the ear. In the fifteen patients of the I. group the discharge ceased in twelve; of these twelve the perforation had closed in eight and become smaller in four. In the other three cases discharge remained. In the II. group the result in nine was negative, in eight otorrhœa ceased in sixteen days. In the III. group the result was negative in five, in the others the conditions were somewhat improved.

The favorable action of ferripyrrin is certain but depends upon the character and severity of the disease. It acts weakly astringent, disinfectant, and resorptive.

SACHER.

d.—DEAF-MUTISM

36. SCHEPPEGRELL, W. A critical summary of literature on the influence of heredity on deafness. *Am. Journ. of Med. Sciences*, Feb., 1900.

37. HUTH, ALFRED H. Consanguineous marriage and deaf-mutism. *Lancet*, Feb. 10, 1900.

38. MÉNIÈRE, CASTEX, and GROSSART. Medical examination of the new cases at the National Institute for Deaf-mutes. *Bullet. de laryngologie, otologie, etc.*, Dec. 30, 1899.

39. SCHWENDT. Examination of deaf-mutes. *Wien. med. Presse*, No. 43, 1899.

40. TREITEL. On the value of hearing exercises in deaf-mutes. *Therapie der Gegenwart*, March, 1890.

36. SCHEPPEGRELL reviews the literature, opinions, and theories from the earliest writings up to the present time, and submits a table of statistics showing the number of deaf-mutes in different countries. The relation of deafness and mutism was not realized until the latter part of the sixteenth century; then it was learned that the faculty of hearing was necessary for the development of speech. The subject is divided into two classes: first, congenital, and second, acquired deafness. Hearing is absolutely lost in about 39.7 per cent. of the congenitally deaf, though noises of great intensity are apparently heard and transmitted through the nerves of general sensibility. Accidents accompanying instrumental delivery add to the many difficulties in distinguishing between congenital and acquired deafness. It appears that one half the cases of deafmutism develop before the fourth year.

The question of intermarriage of deaf-mutes is dwelt upon. Where both parents were deaf-mutes 13.3 per cent. of the offspring were afflicted against 6.8 per cent. where but one parent was deaf. As a predisposing cause consanguineous marriage is looked upon by some as responsible for 25 per cent. of the cases of deafmutism; by others the percentage is placed as low as 6. Even when there appears no hereditary predisposition to deafness, such marriages have a marked influence on the propagation of deafmutism.

J. B. CLEMENS.

37. HUTH has carefully considered many statistics in reference to this interesting question, and deduces that "Although, however, there is no evidence that consanguinity produces deafness, or, indeed, as I have shown in my 'Marriage of Near Kin,' any other disease, it is not advisable on the grounds of heredity for a deaf person to marry a relative when there is deafness or even a tendency thereto in the family."

His paper must receive careful attention.

ARTHUR CHEATLE.

38. The examination showed the following result: Middle-ear disease was of only slight influence on the deafmutism. Six of 24 cases showed changes in the middle ear, adenoid vegetations were present in 5 cases. The central nervous system seemed to be the main locality for the morbid changes which produced the deaf-

mutism. Sixteen cases were congenital, the acquired form showed a much lesser degree of deafness. One child only came from deaf-mute parentage ; in 4 cases the parents were consanguineous. A marriage between cousins produced 13 children of whom 3 were deaf-mutes. Many of the children came from poor, ill-ventilated dwellings.

LEDRY.

39. The deaf-mutes possessed all the remnants of hearing which could be discovered in them, before any systematic hearing exercises had been made.

An improvement was present at each new trial. In those deaf-mutes whose hearing fields are as large as those not deaf-mutes, but hard of hearing, there is a possibility of improvement to the point of understanding conversational voice, and even without real hearing exercises, though the latter would undoubtedly be of some benefit.

POLLAK.

40. According to TREITEL a definite opinion on the value of hearing exercises in deaf-mutes cannot be given at present.

HARTMANN.

EXTERNAL EAR.

40. LERMOYEZ. Treatment of eczema of the auricle. *La presse médicale*, No. 1, 1900.

41. SARREMONÉ. Facial neuralgia of aural origin. *Arch. internat. de laryngol., d'otologie et de rhinologie*. Tome xii., No. 6, Nov.-Dec., 1899.

42. PASSOW. Fracture of both external auditory canals from a fall from a bicycle. *Monatschr. f. Unfallheilkunde*.

43. SCHWARTZ. Acquired atresia and stricture of the auditory canal and their treatment. *Arch. f. Ohrenhkl.*, vol. xlvii., p. 71, and vol. xlviii., p. 261.

40. LERMOYEZ discussed aural eczema from the clinical standpoint. As regards treatment he is eclectic. In the application of every local treatment the individual susceptibility for each drug must be regarded. "Il faut respecter les caprices de chaque peau."

SCHWENDT.

41. SARREMONÉ observed unusually severe facial neuralgia in several cases which disappeared after treating the eczema of the auditory canal.

SCHWENDT.

42. A fall on the chin caused a hole to be made in both bony auditory canals ; the middle and inner ears were unaffected.

The lower jaw was immobilized with a bandage. A fragment of bone $\frac{1}{4}$ cm long and broad was removed after it became loose. Recovery without stricture of canal. BRÜHL.

43. Twelve cases of atresia of the auditory canal are reported as the result generally of previous mastoid operations. The author gradually comes to the conclusion that the radical operation was necessary for permanent cure. In seven cases there was a cutaneous or bony-cutaneous stricture. Eleven cases were operated upon; in two of these, the radical operation was not done, and a stricture again appeared, though in one after an interval of six years, produced by new bone formation of unknown cause.

SCHWARTZE emphasizes the importance of retracting the auricle, and making a large operative field.

BLOCH.

(To be concluded in next number).

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ARCHIVES OF OTOLOGY.

ON THE INADEQUACY OF SOME OF THE ARGUMENTS IN FAVOR OF HELMHOLTZ'S THEORY OF THE TRANSMISSION OF SOUND IN THE MIDDLE EAR.

BY DR. GUSTAV ZIMMERMANN, DRESDEN.

Translated by Dr. J. A. SPALDING, Portland, Me.

LAST year I published two papers,¹ with the aim of showing that in all probability that portion of Helmholtz's theory which refers to the transmission of sound to the middle ear was erroneous. I asserted, for instance, that "all vibrations of sound passed indiscriminately through the *Mt* to the air of the middle ear and the bone of the cochlear capsule, and from here betook themselves directly to the labyrinthine capsule without needing any conduction through the chain of ossicles. For, with ordinary vibrations of sound, the *Mt* is not, as Helmholtz assumed, moved in and out *in toto*, nor is the chain of ossicles or the labyrinthine fluid (even in the slightest degree) displaced *as a whole*. If, moreover, with a small minority of vibrations, any such motions are accomplished, they do not serve the physiological purpose of carrying the sound to the ear and causing it to be perceived, but, on the contrary, to weaken it and to regulate it to the finest shades of perception."

Since finishing these earlier papers I have worked out two others, one from a physiological point of view,² and one from an otological,³ made them thus accessible to a still nar-

¹ "Zur Physiologie d. Gehoerorgans." *Münch. med. Wochensch.*, 1899, Nos. 19 and 22.

² "Die Uebertragung d. Schallschwingungen," etc. *Arch. f. Physiologie*, 1899, Supp.

³ "Der Werth unserer Stimmgabelpruefungen auf Grund einer Nachpruefung d. Helmholtz'schen Theorie." *Verhandl. d. Otol. deutschen Ges.*, Jena, 1899.

rower circle of special students, and additionally prepared myself for objections likely to be raised.

Leaving aside a paper by Matte,¹ because, instead of bringing any proof, he simply thrusts my theory aside as of no account, I shall here confine my replies to the arguments of competent writers who still maintain the truth of Helmholtz's theory of the transmission of sound.

On asking a former teacher of mine, an *eminent physiologist*, his opinion of Helmholtz's theory of sound, he replied: "If you close both windows you produce deafness, and that proves that molecular vibration through the bones is not the path along which sound normally passes. The drumhead with the ossicles is the true road." Now, this train of thought and argument has influenced more or less the thoughts of all investigators ever since the actual purposes of the middle-ear apparatus have been studied; but, attractive as it appears, it has actually but little weight, as can, for instance, be shown by a simple example.

Every steam boiler has as integral parts two orifices, one to let off the steam and one by which to regulate the pressure. Both orifices are indispensable, and if completely or even partially closed instantaneously destroy the mechanism of the boiler. Now it would never occur to anyone to consider these orifices as the path along which the boiler must be heated. The heating is done through the walls of the boiler. It is precisely so for the conduction of sound into the inner ear. Just like heat, so sound penetrates all solid media, and also through bone without the need of any accessory apparatus. Here, too, the window orifices are not the path along which sound must indispensably attain the inner ear; they are only indispensable integral portions of the ear by means of which the sound that enters through the bony walls into the inner ear may there develop its specific action and energy.

If we imagine the labyrinthine windows completely walled in and the labyrinthine fluid everywhere surrounded by a rigid bony capsule, there is not the slightest reason why, despite this condition, sound should enter the bone and pene-

¹ *Arch. f. Ohrenheilk.*

trate within its contents. Just as the ticking of a watch extends along a solid log of wood, so does it penetrate also into and through a capsule filled with fluid. If, however, it is to produce within this capsule not merely molecular movements as in simple propagation of sound, but regularly arranged vibrations like those of a sympathetically vibrating fibre, then this rigid capsule must yield at some one spot, so that the vibrating fibres shall not only have a chance for play but shall accurately obtain the direction in which they shall begin their excursions—that is to say, in the direction of the least resistance. This one spot is *the round window*, the membrane of which is perfectly fitted and alone is sufficient by its alteration in form to yield to the most minute variations of vibration which can possibly be produced by the resonance of fibres suspended in the labyrinthine fluid.

The oval window, on the contrary, together with the middle-ear apparatus, forms the equally indispensable regulator for arranging the intra labyrinthine pressure to the degree best suited for the perception at any given time. The disturbances caused by closure of both windows are, I now maintain, easiest and best explained from this point of view, and, more than that, we are not compelled to assume that the windows are the only path along which sound can possibly reach the inner ear.

Let me next venture to suggest from *an anatomical point of view*, that the window orifices cannot be the path along which sound is conducted, because neither of them, and especially one, can possibly be touched by the chief mass of sound which enters the ear.

The only entrance for sound into the ear that can be called the normal one is the external auditory meatus. All other paths for the reception and extension of sound are obstructed by the strong exterior envelopes of the soft parts, and by the interposition of innumerable obstacles, such as heterogeneous and interrupted cartilaginous structures. If, now, in a marcerated temporal bone we cast a glance at the inner wall of the middle ear along the axis of the bony meatus, the only part of the labyrinthine capsule that comes

into view is that which corresponds to the promontory and the cochlea lying behind it. The two window niches lie upward and backward, and can only be seen when we look diagonally from below and in front, upward and behind. It goes without further argument, so far as *the round window* is concerned, that only a few wandering waves of sound can reach its membrane, and these only by a circuitous path. For the membrane lies like an asymmetrical cupola in the upper portion of a niche arising tunnel-like from below. Hence, waves of sound must either penetrate the outer bony wall of the niche, so as to reach the membrane slantingly, or, extending along in the middle ear, they must by various reflections be brought from below against its surface. Both ways are devious, and there is no reason why sound should take them at all, when propagation along the bone, directly to Corti's organs, is so much nearer at hand.

Furthermore, the position of the *oval window* outside of the circle of projection argues against transmission along this path in all those cases in which, the *Mt* being absent and the chain of ossicles interrupted, we still insist on the propagation of sound directly through the plate of the stapes. In this case also, only a minimal portion of the waves can be utilized, and it would still remain forever unexplained why the greater mass of waves of sound should be entirely inactive and unutilized.

In other cases, the normal ones, in which conduction does not take place directly through the stapes, but, as hitherto assumed, through movements communicated to the stapes-plate through the *Mt* and ossicles, it would be of still less consequence whether the oval window lay directly opposite or obliquely to incident rays of sound. And at this point other considerations begin to have weight.

Many are the ways in which the ossicles have been assumed to transmit waves of sound communicated to them from the *Mt*. The oldest theory (Johann. Mueller's) is molecular transmission, precisely as along a rigid staff. This has been abandoned, because the ossicles do not represent such a staff, but, with interposed articulations and intra-articular cartilaginous discs and innumerable points of contact

with the wall of the middle ear by numerous bony projections and ligaments, they obstruct an exact and insulated transmission of sound to the oval window.

Mueller based his theory on the correctly recognized truth that only the most violent action of sound can move the *Mt in toto*. This truth Helmholtz neglected when he asserted that all waves of sound, indiscriminately, moved the *Mt in toto* and with it the chain of bones, and in that way nearly at the same instant displaced the labyrinthine fluid as a whole from the oval window to the round. He based his argument, as I have before insisted, on experiments with *forcible vibrations of sound*, and then transferred the results universally to all vibrations, no matter how delicate. But we can prove that in the vast majority of vibrations which are simply perceived as such, it is impossible for the *Mt* to be dislocated inward and outward *as a whole*.

At this point I come to a counter-argument advanced in favor of the Helmholtz theory from a *physiological point of view*. One of our most able physiologists cites the great length of waves of sound to show that all of the molecules of the *Mt* must simultaneously perform the same movement, and hence that the *Mt* must oscillate *in toto*.

"Inasmuch," he says, "as the rapidity of the extension of sound in the air amounts to 340 *m* a second, it must be greater still in the *Mt* itself. In bone it has been estimated at 2000 *m* a second. If we assume only 1000 *m*, we have a wave-length of 2 *m* for a tone of 600 vibrations in a second, and for a tone of 20,000 vibrations, lying well up to the highest range of perceptivity, a wave-length of 5 *cm*. This, however, would require that collectively all of the molecules of the *Mt* lying in the direction of the sound and not more than $\frac{1}{10}$ *mm* apart should be in the same phase of vibration whilst a wave of sound passes through the *Mt*. But if all of the molecules of the *Mt* simultaneously perform the same movement it means that the membrane vibrates *in toto* no matter how minute the vibrations may be."

These deductions deserve great consideration for the very reason that they have often been compulsorily employed to support the prevalent opinions upon this topic. They do,

of course, prove that during the passage of a wave of sound through the *Mt* all of its molecules are simultaneously set in motion. But in arriving at such a conclusion we must be aware that no account is made of the interval which lies between the wave contact on the external and internal layers of the membrane, and by which additionally the molecules of the outer side again fall into a state of rest. As this interval amounts to hardly a ten-millionth of a second, it may be very properly left out of consideration in comparison with the larger space, *e. g.*, $\frac{1}{8000}$ th of a second occupied in transit by a wave of 500 vibrations.

Taking these things for granted, we may possibly assert that the molecules of the *Mt* are all simultaneously in motion to one wave of sound, but we cannot prove from the previous deductions that they all also participate in the same motion. In order to decide this, we must not so much investigate the amplitude of the waves as the extent of excursion which every molecule makes, and these are two very different things. For, whilst the wave advances through considerable distances, each separate atom through which it passes moves but slightly to and fro, and a wave of longer length does not produce correspondingly broader excursions of the vibrating molecules. Whilst the separate waves of a tone of 500 vibrations, *e. g.*, move 2 *m* in $\frac{1}{8000}$ th of a second, each individual molecule needs to pass over but an infinitesimal space in the same time, the extent of that space depending plainly and solely on whether the molecules of the *Mt* mutually vibrate in similar phases or not. A molecule on the outer side would have to move 0.1 *mm* from its position of rest if at the same time the opposite molecule on the inner side of the *Mt* is to be simultaneously touched by the sound and included in the same phase of vibration. If the width of the vibratory wave is less, say 0.01 *mm*, the molecule passes only through $\frac{1}{80}$ th of the thickness of the *Mt*, and then begins to oscillate back. The adjacent molecules in turn take up the movement, transmit it to the second tenth of the *Mt*, after they have exhausted their amplitudes, and so the play repeats itself in the following segments until at last at the end of this series the molecule on the inner side is struck and

driven inward. During these incredibly rapid processes the molecules of the various portions of the *Mt* must necessarily belong to entirely different phases of movement and must remain so, so long as the wave of sound is passing through. Therefore, we can only claim that the *Mt* oscillates or vibrates *in toto* when the molecular amplitude is as great or greater than the thickness of the *Mt* itself, and when all of its molecules perform the same movement.

In order to verify the theory that the *Mt* vibrates *in toto* to all waves of sound and in that way conveys sound to the middle ear, we must prove that all waves of sound perceived by the ear have an amplitude of at least 0.1 *mm*. No such proof can be brought, and, on the contrary, we know of waves of sound that are actually audible, yet that do not have an amplitude of even a millionth of a single millimetre.

The extent of the molecular amplitude, as I have repeatedly insisted, is not determined by the various lengths of the waves. It may vary with tones of same pitch, it may be identical with low as with high tones, and is determined by the height of the waves, *i. e.*, by the intensity of the sound, which may be slight, or by the cessation of the production of sound, or, decreasing with the square of the distance from the source of sound, it may diminish to zero. Exact experiments with organ pipes have shown amplitudes for perceptible tones from 0.00004 to 0.0000001 *mm*. Hence, if we consider how these infinitesimal values may be diminished by reflexions and refractions in the curvature of the meatus and further reduced by obstructions in the substance of the *Mt* itself, we prove that such tones must have passed through the *Mt* without having set it into vibration scarcely at all, to say nothing of vibrating it *in toto*. Nor does it seem credible that the tones could have been transmitted by movements of the ossicles, because they have not received the slightest impulse from the *Mt*. Molecular transmission by the ossicles as a chain seems impossible from its very construction, and I feel that there is no other escape than to urge my theory: that the tones have communicated directly with the cochlear capsule through the air of the middle ear.

If this is possible for the most delicate vibrations at the upper limit of perception, how much more probable, with more intense vibrations of sound, to assume that they too may extend along the same path and that they actually do not need any sort of conducting mechanism or accessory apparatus. Furthermore, we may go so far as to demand for such intense vibrations some protecting and regulating apparatus to deaden those that are too powerful and to diminish slightly the force of those that are a trifle less intense. Now the middle-ear apparatus, from the *Mt* to the plate of the stapes, all included, seems admirably adapted for some such purpose as this. The more we think of it the more incredible it seems that so highly organized a sense as that of hearing should dispense with such protections to stretch its fibres or to dampen them exactly and accurately as is the case with every musical stringed instrument.

A skilled otologist argues against my theory, calling to his aid the mechanism of the phonograph. He lays emphasis on the tin-foil impressions made by the phonographic pencil upon the cylinder, and urges by analogy that in the same way in the ear the chain of bones transmits sound and makes it audible. Here lies apparently an important objection to my theory, and one indeed which I personally perceived, and which for a long time held my judgment in abeyance. The mechanism in both cases is the same so far as that the sound passes through a delicate elastic plate connected with a lever mechanism. Hence, of course, a similar sort of mechanism suggests a similar method of accomplishing the function. More careful examination, however, shows important differences both in the action and in the construction of the two. For, first, the phonograph is far from reacting to all those finer shades of sound to which the ear actually reacts by perceiving the sound. Gentle whispers, the song of distant birds, fail to move the phonograph in the least degree, yet such sounds our ears perceive. And if we compare the two in construction we find that those tones which could not possibly have set the phonograph in motion, and yet were heard by the ear, could not have excited the function of the middle-ear apparatus, and must without

its assistance have communicated themselves to the inner ear, because the middle-ear apparatus is far less sensitively constructed than the phonograph. The articulation of the phonographic plate with the lever is not accomplished by a firmly invoven mechanism, as is the case of the handle of the hammer with the *Mt*, but by means of an elastic spring which gives a much more free and delicate play to the leverage. Another point in favor of the phonograph is the constructive difference in the arrangement and apparatus in which in both cases the sound is received. The large sound-funnel of the phonograph aims to collect the greatest possible volume of sound so as to increase the number of waves and the intensity and rarefaction of the particles of air, and to magnify in every way the intensity of the sound, whilst the contracted, tortuous meatus, of varying width at various portions of its course, lets in fewer waves of sound than the phonograph, to begin with, and then reduces their intensity by reflexes and changes in curvature. In this way, evidently, the smaller number of effective tones, which in contradistinction with those in the phonograph finally come to account in the middle-ear apparatus, is still more diminished and even literally reduced to those that were originally the most intense of all. If, however, such waves finally move the angular lever of the ossicular system, the method is the same as in the phonograph: With the greatest truth and precision each time, as upon the cylinder of the phonograph, an impression is produced upon the labyrinthine fluid. Only, let us urge, we cannot make use of this pressure to support the hypothesis that thereby the vibration of similarly tuned fibres is established, for I maintain, on the contrary, that this pressure obstructs such vibrations.

That this is not a mere supposition of mine can be proved by an experiment long ago made by Gellé, but ever since utilized for an entirely different purpose. If we press firmly the nozzle of a rubber bag into the meatus and place the stem of a vibrating tuning-fork upon the body of the bag itself, the tone of the fork is heard distinctly and powerfully, but if we compress the bag, then with every act of pressure

we hear the tuning-fork less distinctly, and again with every relaxation of the pressure we hear the tone louder again. The compression of the air has pushed in the *Mt* and the chain of bones, whereupon the plate of the stapes thus driven in against the labyrinthine fluid has increased the hydrostatic pressure, which has in its turn acted like a damper on the vibrations of the labyrinthine fibres.

I come next to the objections expressed by an *eminent clinician*. To my assertion that sound is not transmitted through the chain of bones and that the *Mt* tends to diminish sound, he correctly replied that "if this were true we should expect that every patient who had submitted to the radical operation would hear many things much better than people with normal hearing."

This is indeed a correct conclusion to draw from the circumstances, but in this instance we must define the term "hear better" more accurately. A patient who has had the radical operation performed will actually hear individual and connected sounds louder than before, because their intensity is no longer diminished by the interposition of the *Mt*. But it is impossible for him to hear more distinctly or more exactly, because his accommodation for perceiving different sounds is more or less lacking in perfection. He can no longer, amidst the tumult of sounds (which is of course louder than in a person of good hearing), differentiate the tones. It is precisely as when the eye after a cataract-extraction sees everything with the greatest brilliancy but cannot distinctly distinguish the contours of objects because its accommodation is lost by the removal of the lens.

Let me next reply to an objection raised by Bezold. I had asserted that in Rinne's test bone and aerial conduction were compared under two entirely different conditions. In testing bone-conduction we use the stem of the tuning-fork, and in testing aerial conduction, the prongs. Hence we must reach false conclusions, because the stem and the prongs are not of equal value, since the prongs still give off audible vibrations at a time when vibrations from the stem have long since ceased to be heard. Bezold replied that "there was no real difference in the duration of vibrations,

because the stem and the prongs vibrated for exactly the same length of time."

Now it is in the application of this last remark to our present tests for hearing that lies the fundamental and serious error which has up to this time been received as truth, but against which I now protest. When we test the hearing, the question is not whether the stem and the prongs of the tuning-fork vibrate for an equal length of time, but whether they vibrate in the same way and with the same audibility. That they do vibrate in the same way and with the same audibility I deny most emphatically. Similar duration of vibration is far from being the same thing as similar duration of AUDIBLE vibration. Bezold himself has said that the movements of the stem of the fork are as in a two-armed lever, smaller but performed with correspondingly greater intensity. Granting that this is true, then, evidently, the intensity of vibrations, at first greater in the stem, would be rapidly exhausted (in heat inversely) first by the contact of the hand holding the stem, and then by the stem acting as a unilateral damper upon the vibrating middle-part of the fork itself. So that thus we should have various mechanical influences at work unfavorably to the stem and revealing themselves in different durations of audibility.

This we can unmistakably prove by the following simple example: If we compare the tone given off by the stem and the prongs of a fork held at equal distance from the ear, we hear the stem-tone of the A fork 13 seconds and the prong-tone 50 seconds; the stem-tone of the small C fork 10 seconds and the prong-tone 45; the stem-tone of the C fork 15 seconds and the prong-tone 50. Therefore, I say again, that the stem and the prongs of tuning-forks when used as a basis for testing the hearing are totally different things. Such equalization of values as Bezold would like to have is absolutely without foundation, and fatal, if upon it we build comparative investigations upon the nature of aërial and bone conduction.

At another place¹ Bezold concludes from Rinne's test that "under normal conditions aërial conduction always prepon-

¹ Ueber d. Funct.-Pruefung d. mensch. Gehoerorgans, Wiesbaden, 1898, p. 40.

derates largely over bone conduction." This conclusion, I reply, is deceptive, and deduced simply from the fact that the stem of the fork is tested from the bone, and then instead of testing the same stem by the air, they proceed to test the prongs by the air. If, as in all logically exact comparisons, scientific aurists would only take the same standard of measurement for bone and aërial conduction and test in each case with the stem instead of with the prongs (which are available only for aërial conduction) then we should see exactly the opposite to what is now asserted as the truth; namely, we should find bone conduction actually preponderating over that by the air. When the vibrating stem can no longer be heard by aërial conduction it can generally be heard by again placing it upon the bone, but when no longer heard by bone conduction *it can never be heard again through the air*. The difference which has always been found in the tuning-fork tests hitherto employed, and which has been erroneously referred to the fault of natural differences in different paths of conduction, is really due to the different behavior of the stem and the prongs of the fork, and simply resolves itself into a purely quantitative preponderance of the so-called bone conduction, provided that the forks are correctly placed.

To the denial or to the lack of recognition of this essential truth is to be ascribed the reason why no one has hitherto attempted any revision of Helmholtz's theory, demanded, nevertheless, as it has been, by other considerations. So long as the authorities agreed with Bezold, that air conduction was more powerful than that by the bone, just so long were they compelled to conclude that the apparatus which they regarded as the characteristic and unique basis for aërial conduction, namely, the *Mt* and the chain of ossicles, must be of decisive influence in the conduction of sound.

This state of affairs has been additionally complicated by the assertions of Lucae and Politzer and the zealous furtherance of Bezold, that bone conduction, to be of any use, demands the presence of the entire middle-ear apparatus, and must additionally be called not only cranial but tympano-

cranial conduction. All such assertions can, nevertheless, be clinically shown to be far from substantiation, because, without any middle-ear apparatus, bone conduction can be plainly demonstrated, and because, theoretically, no arguments have yet been advanced to support them, as I have repeatedly urged in former papers.

Although I have here attempted to show the weakness and inadequacy of some of the arguments and proofs advanced in favor of Helmholtz's theory, I am well aware that the last word in so important a topic has not yet been said. The overthrow of such a theory, long since accepted by the leading *physiologists* of all lands, and supported by *clinical contributions* by the most skilled otologists, can only be accomplished by complete refutation of the observations that support it. Taking into consideration the enormous testimonial material in its favor, any comprehensive view of all the individual details is difficult to make, and a final judgment will only be rendered possible by the coöperative or the antagonistic labor of all who are competent in the matter at stake.

ANATOMICAL INVESTIGATIONS ON THE HYPERTROPHY OF THE PHARYNGEAL TONSIL.¹

By J. HYNITZSCH, STRASSBURG.

(*With Plate C of Vol. XXXIV., German Edition.*)

Translated by Dr. O. JOACHIM, New Orleans, La.

UNIFORM views on the etiology of the pharyngeal tonsil have not yet been arrived at notwithstanding the discovery of the interesting physiological function of the tonsils by Stoehr, and their thorough pathologico-anatomical investigation by Strassman, Schlenker, Kruckmann, and Dmochowski. The similarity of symptoms presented by sufferers from adenoid vegetations in the pharynx to the complex of symptoms as seen in scrofulosis and similar constitutional anomalies, naturally suggested the idea that a latent tuberculosis was the origin of the hypertrophy of the pharyngeal tonsil. The attempts of Lermoyez and Dieulafoy to establish for this theory a firm basis by inoculation with particles from hyperplastic pharyngeal tonsils have, on account of doubtful results, failed to find the desired recognition. The results of the reactions of tuberculin met with a similar fate.

Equally inconclusive were the results of microscopic examinations of extirpated pieces of pharyngeal tonsils. Gottstein reports tuberculosis 4 times in 33 extirpated pharyngeal tonsils, and Brieger only 5 in 78 cases. On account of this uncertainty Professor Kuhn requested the

¹ From the University Ear Clinic of Strassburg.

author to subject all the pharyngeal tonsils removed in the ear, nose, and throat clinic of the Strassburg University to a careful microscopical examination for tuberculosis. In the course of this examination the fact became apparent that the common hypertrophy of the post-nasal tonsil presented anatomical changes worthy of a precise description. These examinations will be first described; 180 post-nasal tonsils were examined microscopically. In 49 cases the faucial tonsils were likewise enlarged. Five of the cases were a recurrence of the growth. Only 7 cases of the 180 pharyngeal tonsils showed tubercular changes, 173 simple hypertrophy.

I.—HYPERTROPHY.

In a large series of sections two types were especially apparent, which in most cases were easily distinguishable; in some cases, however, one merged into the other. A considerable increase in the *number of follicles* established the hypertrophy in one type, the varying intensity of the *inter-follicular tissue* in the other.

The number of follicles often increased to such an extent as to occupy nearly the entire field of vision, leaving between them only small bands of interfollicular tissue. These follicles appeared frequently superimposed in 3-4 rows parallel to the surface in regular arrangement.

Besides this increase in number they varied so enormously in size as to permit at times their macroscopical recognition during the process of staining; at other times they were only microscopically recognizable as present in large numbers. Histologically they showed no particular peculiarities; they were round, consisted of finely reticulated leucocytes, and frequently stained intensely in the peripheral zones, whereby they were easily differentiated from their own centre and from the interfollicular tissue. The outlines of larger follicles were now and then obliterated and several of them appeared to form a large confluent area with a disintegrated centre, conveying the impression of a pus focus wherever it was not lost by manipulation. No epithelioid or giant-cells

of Langhans were observed, nor anything which pointed to tuberculosis. Trautmann and others have described similar pus centres in hypertrophied pharyngeal tonsils. The interfollicular tissue participated likewise, as above indicated, in the hypertrophy of this tonsil. In some sections it was extremely difficult to bring a follicle into the field of vision, especially as in these instances the tonsil seemed entirely composed of interfollicular tissue without any recognizable stripes of callous connective-tissue within the tonsil. Callous thickening of this kind was only to be seen in the fibrous connective tissue at the base of the skull with which the tonsil is connected. These bands never extended into the adenoid tissue of the tonsil.

Hemorrhages into the follicular and interfollicular substances were observed and noted to be a diffuse sprinkling of red blood corpuscles for a considerable distance into the adenoid tissue. Yellow pigment occurred between the cells and within the protoplasm of the leucocytes, evidently blood-pigment, easily observable with small magnifying powers, resolving itself under higher powers into a deposit of minute yellow granules, partly free in the tissue, partly within the leucocytes characteristic of pure pigment-cells. Some small and large clear and transparent bodies were scantily observed under small amplification, resolving themselves under higher powers into an aggregation of fine fibrinous threads interspersed with red blood corpuscles, which had lost their color during the process of washing out. The author attributes these latter formations and the shadows of blood corpuscles to spontaneous hemorrhages, the former to artificial hemorrhage of the operative procedure. Chalky concentric deposits were observed only in single instances within the crypts and in the interfollicular tissue. Their presence had produced no abnormal condition in their surroundings.

The surface epithelium and the epithelial lining of the lacunæ, which extended at times quite deeply into the tissue, showed various conditions. Wherever the covering epithelium had not been artificially disturbed, stratified columnar epithelium, frequently well ciliated, or stratified squamous epithelium was observed, one frequently merging

into the other. The columnar epithelial cells showed frequently a basal nucleus and often a clear transparent condition, which characterized them as goblet-cells. Within the crypts stratified columnar epithelium was found quite regularly down to the depths of the lacunæ, stratified squamous epithelium rarely. Both varieties of epithelial covering were plentifully supplied with leucocytes, especially in the lacunæ, rendering the basement membrane indistinct and extending into the adenoid tissue. Quite different from the squamous epithelium, the columnar epithelium always appeared as a single layer, without proliferating processes on the surface. Two cases only were conspicuous by epithelial aggregation within the crypts. Their lumen was obliterated by an accumulation of fine ramified cords, which resolved themselves under high power into thin capillary tubes, covered like the crypt walls with columnar, resp. ciliated, epithelium. These fine capillaries could be discerned to arise and proceed from the adenoid tissue into the crypts by lifting off the epithelial covering and pushing it forward. The villous elevations showed great similarity to the papillomatous proliferations of the mammary and ovarian cystadenoma. Wherever they were numerous they destroyed the epithelial covering by pressure, and the tubular lacunæ looked like glomeruli. Otherwise the contents of the saccular and tubular lacunæ appeared like mucus or pus.

Corresponding to the two varieties of epithelium the author found and differentiated two kinds of cysts: First, the *columnar*, and secondly, the *squamous epithelial cyst*. In no case does he remember to have seen them combined. The former varied in size from a microscopical body to a bean and appeared as a gelatinous formation of round shape, its walls lined with stratified columnar epithelium, covered with ciliæ wherever the contents had not caused their flattening by pressure. These cells were rarely of the goblet type. A well-defined basement membrane separated this columnar epithelium from the interfollicular substance, except at those places where the intercellular substance was infiltrated with leucocytes. The contents consisted of a clear, ropy mucus, often rich in leucocytes, with an

occasional red blood corpuscle. In two cases a large cyst contained considerable multinuclear elements—veritable giant-cells—varying in form and size, with single or multiple processes. The nuclei, greatly varying in numbers (as many as sixty), were of irregular order and never exactly along the line of the wall, and therefore essentially different from the giant cells of Langhans observed in tuberculosis.

They were easily recognized throughout all series of specimens. Smaller caudate cells with granular protoplasm were not infrequent. The author calls attention to the fact that this kind of giant-cell suspended in cysts has no relation to tuberculosis.

Squamous epithelial cysts were much rarer. They differed macroscopically from the former variety principally by their brownish-yellow jelly-like contents. These spherical cavities were lined with stratified, horny, squamous epithelium, which outlined itself against the surrounding tissue more distinctly at such places only where the individual epithelial strata were not infiltrated with round cells. Otherwise the basement membrane of the lining epithelium was well marked. These cysts contained horny lamellæ of concentric arrangement, with an undefined centre filled with amorphous granular masses, many fat-globules, and cholesteroline crystals. The latter were also present in the horny lamellæ as well as in the centre. The larger part of the crystals were dissolved by the ether used in mounting. The size of these cysts varied from an epithelial pearl to a Lima bean. In their microscopical structure they look like small cholesteatomata. Others, especially Tornwaldt, have made similar observations without, however, differentiating the two varieties.

The origin of these cysts is attributed by Tornwaldt principally to the pharyngeal bursa, which the author considers likely, especially as to the mucous cysts, but he claims for them, as well, the genesis of all retention cysts. A connection between the cyst and a true submucous gland could in no instance be established. Attention is called to the presence of numerous giant-cells and the aggregation of

cells in the mucous contents of open cysts lined with cylindrical epithelium.

The genesis of the cholesteatoma-like horny cysts may be best illustrated by their smallest variety, which could not be distinguished from the usual epithelial pearl. Such pearls were often met with at the point of an epithelial offshoot which extended from the surface into the deeper tissue. The author deducts the origin of this second variety of cysts from the continuous proliferation of horny lamellæ with central fatty and granular degeneration. They may occasionally be produced by occlusion of lacunæ lined with squamous epithelium by proliferation of adenoid tissue in their surroundings.

II.—TUBERCULOSIS.

In the history of the appended cases tuberculosis of the pharyngeal tonsil shows a uniform picture. Its clinical symptoms are in no way different from those of simple enlargement, which is the reason for the supposition of latent tuberculosis. The tubercular nature is only recognized by microscopical examination, which yields a characteristic picture most nearly resembling glandular tuberculosis.

Instead of adenoid tissue rich in follicles, small round areas are observed in varying number, distinguishable by the faintness of their stain. These areas become confluent and form broad lines of ill-stained tissue separated by narrow strips of well-stained adenoid tissue. The difference of color is most always visible to the naked eye. The periphery of these areas is formed of pale, elongated, so-called epithelioid cells; their centre of clear hyaline, partly granular cheesy masses. Typical giant-cells of Langhans are found among the epithelioid cells, which contain sixty and more parietal nuclei. A light mantle surrounds (halo-like) the nuclear ring and sends finely subdivided processes into the surrounding tissue. These undoubted evidences of tuberculosis were confirmed by the presence of tubercle bacilli in three instances.

The author denies the occurrence of chalky deposits, which were noted in three cases, as evidence for the presence

of foreign-body giant-cells. The giant-cells and the infiltration produced by foreign bodies in their immediate surroundings are never exclusively of the type of the giant-cell of Langhans, nor is the infiltration to be confounded with an epithelioid tubercle with a cheesy centre. The chalky deposits in the giant-cells are unquestionably secondary products like those occasionally found in giant-cells in tuberculosis of other organs. Gottstein has also described them in tuberculosis of the faucial tonsil.

The frequency of tuberculosis amounted to 3.9% in 180 cases of enlarged pharyngeal tonsil. Brieger found 6.4 % in 78 cases. Lermoyez found 6 %, *i. e.*, twice in 32 cases; Gottstein 12 %, *i. e.*, 4 times in 33 cases; Brindel also 12 %, *i. e.*, 8 times in 64 cases; Pluder and Fischer 15.6 % *i. e.*, 5 times in 32 cases. The author found no case of tuberculosis in the first 52 cases he examined, which were followed by 3 positive cases at short intervals. In a relatively small number of examinations the influence of chance on the result cannot be denied. The pharyngeal tonsil had to be removed in 3 patients of the 7 affected by tuberculosis of the pharyngeal tonsil. It was found to be affected with tuberculosis but once. In 46 hypertrophied faucial tonsils removed, together with those affected with simple hypertrophy of the pharyngeal tonsil, no tuberculosis was found.

The author concludes that tuberculosis of the pharyngeal and faucial tonsils is a very rare condition and has no relation to the common and frequent hypertrophy. The enlargement is in the tubercular cases not due to the tubercular infection but to hypertrophy. The infection is to be regarded either as accidental or secondary,—a view which the author shares with others.

The question whether the tuberculosis in these few cases is primary or secondarily due to infection from other organs either through sputum or by way of the blood or lymphatic circulation, is difficult to decide. The diagnosis of primary tuberculosis of the lungs could in all the seven cases be made only in one, and was suspected in a second patient. The faucial tonsil is no less liable to primary infection than any other organ of the system.

CASE HISTORIES.

CASE 1.—Patient twenty-three years, female. Microscopic examination of the pharyngeal tonsil after removal shows tuberculosis. Family history negative. Examination of chest reveals nothing definite; both apices suspicious. Microscopic sections show large superficial, insufficiently stained, infiltrated areas which contain miliary and submiliary nodules with epithelioid cells, undergoing central cheesy degeneration and containing large multinuclear oval, less frequently round, cells. These cells vary in size. The nuclei, often sixty or more in number, are always parietal and surrounded by a zone of granular protoplasm. Fifteen or twenty giant-cells are often visible in one microscopic field; some of them seem filled with concentrically laminated chalky concretions. A peculiar green concretion appeared centrally in one of the giant-cells of irregular, hourglass-like shape, and of a concentrically but mostly of a radiating arrangement (Fig. 2, Plate C). Follicles are only sparsely present. Some gland convolutions are well preserved in the deep connective-tissue layers. The non-tubercular portions of the pharyngeal tonsil contain many well-preserved follicles. Ciliated columnar epithelium lines the lacunæ, which are filled with leucocytes and detritus. Rows of lymphatic corpuscles penetrate into the adenoid tissue through the columnar epithelium. Several vessels were completely thrombosed. In one tubercle nodule two tubercle bacilli were seen. The extirpated faucial tonsil showed the usual hypertrophy.

CASE 2.—Patient, eighteen years old, female. Previous history and physical examination reveal nothing. The microscopic examination of the enlarged pharyngeal tonsil showed infiltrated foci of varying size undergoing cheesy degeneration, epithelioid and some giant-cells of Langhans. The process involves both the follicles and the interfollicular substance. The follicles are well preserved and exhibit a distinct germinal centre. The columnar epithelium is better preserved in the lacunæ than on the surface. No tubercle bacilli.

One or more ramified capillaries were recognizable within the tubelike or slitlike lacunar depressions. They appeared to arise from adjacent adenoid tissue and to protrude into the lumen of the crypts, and were covered with a deep layer of glassy epithelium in continuation with the lacunar epithelium and showing in places ciliated lining. These ramified capillaries became occa-

sionally so dense as to occlude the lumen of the crypts and render the identification of the different tissues difficult. This condition has no relation to tuberculosis and was observed as well in other specimens of common hypertrophy (Fig. 4, Plate C).

CASE 3.—Patient twelve years old, male. Purulent middle-ear disease in R. E. for three months; in L. E. for two months. Tubercle bacilli in sputum for a year past. Glandular enlargement in submaxillary region for ten months. Diagnosis: Otitis media chr. purul. duplex. Enlargement of three tonsils. The tonsils were removed and ten days later also tuberculous polypi from both ears. Bronchial breathing over both lungs. Shortened resonance above left scapula and in right infraclavicular fossa. Microscopical examination of the removed pharyngeal tonsils shows some superficial miliary foci which contain epithelioid cells, a variable number of giant-cells with central cheesy degeneration (Fig. 1, Plate C). The greater part of the tonsil shows simple hypertrophy of the interfollicular tissue. Stratified squamous epithelium covers the larger part of the gland and lines the lacunæ. The hypertrophic faucial tonsil shows no tuberculosis.

CASE 4.—Patient fourteen years old, male. A yellowish-brown material escaped from a cyst during the removal of the pharyngeal tonsil. The microscopical examination of the cyst shows smooth walls covered with stratified squamous epithelium on a basement membrane. Leucocytes infiltrate the epithelial lining. The upper epithelial layer was composed of concentric horny lamellæ, which towards the centre became less distinct, amorphous, granular, and interspersed with fat-corpuscles. Sharply outlined oblong spaces could be seen in the horny layer. They had evidently contained crystals and some were still recognizable by their lustre. Other cysts the size of a pinhead or an epithelial pearl were noticed. The smaller ones preserved the lamellar character of their contents to their centre; the contents of the larger ones approached the type above described. The rest of the tonsil was distinguished by an increase of the follicles and interfollicular tissue. Stratified squamous epithelium replaced the columnar variety everywhere even in the lacunæ. Solid epithelial proliferations protruded into the adenoid tissue containing epithelial pearls. Horny lamellæ encroached upon the lumen of the crypts. Numerous capillaries and larger vessels were thrombosed.

Explanation of the Plate.

- FIG. 1. Tuberculosis of the pharyngeal tonsil.
- FIG. 2. Giant-cells with a chalky concrement.
- FIG. 3. Section through the wall of a squamous epithelial cyst containing cholesteatoma.
- FIG. 4. Papillary excrescence of a crypt.

REPORT ON THE NINTH MEETING OF THE
GERMAN OTOLOGICAL SOCIETY AT HEI-
DELBERG, JUNE 1 AND 2, 1900.

BY DR. SELIGMANN, FRANKFURT-A.-M.

Translated by Dr. C. ZIMMERMANN, Milwaukee, Wis.

MEETING JUNE 1ST, AT 9.30 A.M.

Chairman : KESSEL, Jena.

Business Meeting.

In the absence of Lucae, Kessel opens the meeting with a sketch of the program of the ninth session. An address of welcome was given in the name of the city by Mayor Walz, in that of the Medical Faculty of the University of Passow, for which Kessel returned thanks. Passow reports that the House of Representatives of Baden had concluded the erection of an ear clinic at Heidelberg, and an institute for the partially deaf. Breslau was selected as the place of the tenth meeting. Twenty-one new members were admitted ; three had died, whose memories are honored. The membership is 238. Bezold, Bürkner, Habermann, Hartmann, Kessel, Körner, Lucae, Siebenmann, Wolf, were elected as members of the executive committee. Contributions were solicited for the Troeltsch memorial. In Bavaria, Prussia, and Baden a movement in favor of securing otiatric services in deaf-and-dumb institutions has been made by appropriating funds and instituting courses. Hartmann proposes to establish a centre for the examination of petrous bones of deaf-mutes, for which purpose a committee is appointed. Hartmann reports on the International Otological Congress at London.

HABERMANN (Graz) is elected as first president, SIEBENMANN as second president ; HARTMANN as first, KÖRNER as second secretary.

Scientific Meeting.

Addresses of Drs. KILLIAN and ZARNIKO introducing a general discussion on **diseases of the accessory cavities of the nose.**

KILLIAN reports on the **present state of therapy of inflammations of the ethmoidal cells and sphenoidal sinuses**, the operative treatment of which was initiated by Schaeffer, Hajek, and Grünwald. K. believes that rhinoscopic media, devised by him, will prove an essential progress.

The treatment of acute inflammations is at first expectative : rest, applications, inhalation of steam, sniffing of warm physiological solutions of salt, diaphoresis, antineuralgics, narcotics, no intranasal manipulations. If the acute and chronic affections do not disappear, the sinuses have to be opened intranasally or extranasally. The intranasal procedures are easy, and preferable in wide, accessible noses, or in narrow noses if dilatation is possible, *e.g.*, by submucous resection of deviated septa, or resection of the anterior extremity of the middle turbinated body, or the whole of it (scissors or nasal forceps). K. here recommends his speculum for rhinoscopic media, which renders the olfactory fissure accessible for operations, with preservation of the middle turbinate (*ozæna*). The ostia of the frontal and infundibular ethmoidal cells can only be exposed by removal of the laterally projecting processus uncinatus (scissors, snare, Hartmann's forceps). After the ethmoidal and sphenoidal cavities are rendered accessible they are opened from the ostia by perforating their anterior walls (Hartmann's forceps) and removing their septa. The upper nasal meatus and its cells are best reached by piercing the posterior wall of the bulla, scraping with sharp spoon, tamponing with gauze, and after-treatment by touching with cotton soaked in a 2-5 per cent. solution of nitrate of silver. The extranasal operations have to be resorted to if, in inaccessibility of the inner nose, severe affections require an opening, either orbital or maxillary. The orbital opening is obtained by osteoplastic resection of the nasal and frontal bones and the frontal process of the upper maxilla, with preservation of the trochlea to avoid diplopia.

ZARNIKO reports on **maxillary and frontal sinuses**. The treatment is either causal, by the extraction of carious teeth, especially when filled (the roots of which can be examined by Roentgen rays); expectant, conservative, by establishing sufficient drainage; or radical, by wide opening and scraping. The ex-

pectant treatment is the same as in the acute form : rest in bed, ice, antineuralgics, brushing the nose with 2 % solutions of cocaine, to enlarge the natural ostia and remove the secretion. The other methods are indicated if chronic suppuration has set in. Probing of the cavities through their natural opening must precede the operation.

1. Conservative surgical treatment : Opening of the maxillary sinus by trocar or sharp canula in middle or inferior nasal meatus or from the alveoli of the second premolar or first molar tooth, with an at first fine and then a larger (0.5 cm) drill rotated by an electromotor, and smoothed with a burr. Gauze-tamponing, irrigation. Towards the end of treatment the lumen must be kept open by a wire plug. The canine fossa may be perforated also with Kirstein's nail trocar, which, however, leaves holes that can not be found a second time. A permanent opening is made after dissection of the soft parts from the mucous membrane and displacement of the periosteum with the electric trephine, under cocaine, not in narcosis. The hole must be 0.5 cm wide, and kept open by iodoform-gauze or a prothesis fastened on a tooth.

The frontal sinus is opened by a small incision from the eyebrow or the interior of the nose with a perforator, between middle turbinated body and septum, or with the electric trephine (Roentgen rays), all of which are dangerous methods.

The perforation with subsequent repeated irrigations may be done previously to the broad opening in acute and chronic fetid suppurations. The result has to be watched, even after healing or relief is obtained, as long as a slight suppuration persists. In deeper affections, caries or necrosis, the sinus has to be widely opened for removal of all diseased parts, and careful watching of the healing process.

All methods are mentioned and criticised in detail ; we can only report the most important.

The canine fossa is the only place where, in narcosis, the maxillary antrum is opened by removal of the entire anterior wall with chisel and bone forceps after previously making a trephine hole of 6 mm. Scraping with preservation of healthy mucous membrane, tamponing, later on irrigations, and application of lunar caustic. Until complete healing, which may be accelerated by Thiersch grafts, the wound is kept open by an obturator devised by Z. Then it is allowed to close. (Jansen, Boenninghaus.)

The frontal sinus is opened in different ways by different

operators, on account of cosmetic reasons ; at the same time the ethmoid cells must be opened. Kuhnt incises the eyebrow and removes the whole anterior wall (chisel, forceps), which causes quite a disfigurement if the sinuses are large and deep. Jansen removes the lower wall of the sinus from the orbit, with simultaneous evacuation of the ethmoid bone after cutting away the os planum. But also then disfigurement and infection of the orbit are to be dreaded. Killian takes away the anterior and lower walls, leaving a bony ridge at the orbital margin, introduces a probe into the naso-lachrymal duct, and resects temporarily the nasal bone and the upper portion of the frontal process in form of a flap, which contains also the soft parts, and is replaced and sutured. Irrigation from the nose. Czerny performs the osteoplastic reflexion of the whole anterior wall. Through a hole cut with the chisel the sinus is explored as to its dimensions, and a flap formed with its base upwards and outwards by temporarily resecting the nasal bone and the frontal process, which, after the communication with the nose has been restored, is replaced and sutured. Winckler performs this operation on both sides, if affected, in one sitting.

Discussion.—KÜMMEL : Appropriate intranasal treatment helps essentially to prevent spreading of the suppuration to the accessory cavities. The suppuration is mostly benign. I have opened many accessory sinuses and I never saw caries. The statistics of the clinic showed 35 openings of the maxillary sinus : in 13 nothing was said as to recovery ; 11 were healed by widening of the nasal orifice ; 2 cases were operated on from an alveolus, the others from the canine fossa, all with bad results ; 1 complicated by abscess of the cheek. The best results were obtained by enlarging the nasal ostium and subsequent irrigation, which the patients learn to do themselves. The same was observed in affections of the frontal sinuses : in 6 the result was doubtful, 4 healed by irrigations, 3 by operation, 1 with negative result. Patients with empyema of the ethmoidal and sphenoidal sinuses generally abandoned treatment, although far from being cured. I consider as a cure : not only subsidence of suppuration, but also of fetor. Cases cured by operation are extremely rare.

JENS : I also prefer intranasal treatment, especially irrigations, but for the maxillary sinus from the secondary foramen, not from the narrow hiatus, which lies very high. The ethmoidal cells cannot always be reached in operations from the maxillary sinus

without danger to the orbit. Resection of the nasal septum is not necessary for the opening of the ethmoidal cells, which can be effected under cocaine by introducing a long, narrow chisel along the upper margin of the middle turbinated body. Once I observed orbital emphysema after profuse hemorrhage by violent blowing, but it healed by incising the conjunctiva. The affections with intense fetor recover easier than those without it.

BRIEGER : The danger of suppuration of the accessory cavities is small, according to statistics of my own and of my assistant, Wertheim. Among 10,000 deaths, 6 were caused by it. Of 800 autopsies, 180 (20 %) showed affections of the accessory sinuses. Of these 180, 3 died from it, 1 from cerebral abscess, 2 from meningitis. The ears had been examined in all cases. The maxillary sinus undoubtedly has a tendency to spontaneous recovery after removal of the pus. On account of the sinuous structures of the frontal sinus more scattered foci of suppuration were found, which rather require operation. Such separated foci were also observed by B. from the osteoplastic method, in spite of free drainage towards the nose. In general, the treatment must be varied according to the discomfort caused by these suppurations.

SCHREIBER : I also consider the suppurations of the accessory cavities less dangerous than those of the ears. The cause of death in such cases requires still a careful study. I prefer the conservative method, guarding against noxious factors, as smoking, alcohol, work, instillations, cocaine, snuffs (collapse of the turbinated bodies), irrigations. I puncture the maxillary sinus from an alveolus, and keep it open by a plug manufactured by a dentist. I very rarely have seen necrosis, which explains the rare occurrence of death. The secretion diminishes rapidly after irrigation, but does not always cease entirely ; it increases with new attacks of catarrh.

ZARNIKO : The speculum of Killian for rhinoscopia media enables one familiar with its use to detect a drop of pus oozing from the ostium of the frontal sinus.

MANN : I puncture the frontal sinus from outside for exploration, and then, if necessary, chisel away the bone in lamellæ. If the endosteum proves normal, I close the wound ; if reddened, I make a large opening.

KÜMMEL : Careful intranasal treatment is preferable to a large opening, since the after-treatment lasts very long and gives the same result.

ROBINSON : In probing, the anterior ethmoidal cells are easily reached and may be mistaken for the frontal sinuses. I penetrate into the maxillary sinus with Krause's trocar from the inferior nasal meatus, and irrigate with hydrogen peroxide 5 %. In general more operations will be performed on the polyclinic material than in private practice.

WALB : How difficult probing and irrigation of the frontal sinuses is, is shown by the fact that it very rarely succeeds. It is better to open them widely from outside. The incision laid in the eyebrow is not seen later.

V. WILD : I prefer the natural ostia for irrigation. If these are wide, the sinuses are predisposed for disease. I open the maxillary sinus from the canine fossa with trocar, and irrigate with hydrogen peroxide, and let the patient wear a plug.

Discussion continued at second meeting at 2 P.M.

JANSEN : We may not always consider it essential to stop the suppuration entirely, but there are patients who absolutely wish to get rid of it. An undoubted indication for operation is given, if the empyema has broken through into the neighborhood—for instance, in imminent or formed extradural abscess. The sinus is then generally enlarged, which in the frontal sinus may be observed by bulging of the anterior wall. The suppuration, not infrequently, starts in the maxillary sinus and infects all other sinuses, therefore the operation of the former may protect the latter. Not statistics, but the individual cases decide as to operation. The operation gives the best results in the frontal sinuses, which I open wide by removing the anterior and inferior walls with curettement of the diseased ethmoid. The disfigurement is great only in large sinuses. The size of the sinus may be diagnosed by transillumination. In combined chronic suppurations I have lately avoided the opening of the frontal sinus from outside by entering it from the maxillary sinus (the anterior wall of which having first been removed), through the diseased ethmoidal bone upwards and in front, and around the eyeball, under control of my eyes and fingers, thus establishing free drainage. The complete curettement of the ethmoidal bone from the maxillary sinus rarely succeeds in one sitting, but it is easier than from the nose. The cells covered by the eyeball and projecting laterally are more safely exposed during the after-treatment. During the latter, the access to the ethmoidal cells and sphenoidal sinuses often grows narrow by cicatricial membranes, which must be excised. For years

I transplanted epidermis according to Thiersch into the maxillary sinus and shortened the after-treatment, not requiring the frequent scraping of granulations. The anterior wall becomes cicatrized latest, as it generally is kept moist by pus from the frontal sinus. My Thiersch's transplantations amounted to almost two hundred. The treatment requires six months and more, and the patients must be under medical control for years. I enter, of course, the sphenoidal or frontal sinus only from diseased maxillary and ethmoidal sinus.

HARTMANN recommended, as early as 1883, irrigations from the middle meatus, not through the natural ostium, but through an artificial hole in the thin lateral wall. Irrigations with hydrogen peroxide may bring about a complete cure even if thick, cheesy masses are in the middle meatus or in the sinus. The opening through the canine fossa and insertion of a drain may be done under cocaine with a thick drill after incising the skin and displacing the periosteum. The patients do the irrigation themselves. If recovery is not obtained, a radical operation is performed. The suppuration of the frontal sinus sometimes is cured after that of the maxillary sinus has disappeared. Probing may be deceptive, as often the anterior ethmoidal cells are struck. The complete obliteration of the frontal sinuses from the start is not always necessary; the chief point is free drainage towards the nose by removing the anterior cells. H. recommended to make one opening in the forehead and another in the medial orbital wall; through the latter the septa are removed. For the obliteration of the frontal sinus, the corners especially must be carefully scraped to remove all mucous membrane and granulations.

BECKMANN formerly opened the sinus from outside, but with unfavorable results; he prefers irrigations, by which he cured thirty maxillary sinuses within six months (puncture with trocar from the middle meatus). The causes of maxillary empyema frequently are decayed teeth, empyemata of frontal and sphenoidal sinuses, which also must be cured. For diagnostic purposes B. blows air through the trocar to ascertain the presence of secretion, which succeeds easier in the maxillary than in the frontal sinus. Often we cannot be sure whether we have entered the latter. An opening from the mouth, ever so small, must not be made. If the irrigation fluid runs out clear, the cavity may be dried by an air douche. B. opens the frontal sinuses from the ethmoidal bone; very rarely he had to resort to the extranasal method.

ROEPKE also prefers intranasal opening of the upper cavities for cosmetic reasons.

HINSBERG : After opening of the maxillary sinus from the canine fossa we often find hypertrophy of the mucous membrane from stagnation of pus ; after evacuation of the latter the swelling rapidly subsides. The communications with the mouth must be carefully closed by obturators to prevent the entrance of food. H. punctures the wall from the middle meatus with fine scissors, cuts backwards, and enlarges the hole with forceps. This is difficult in narrow noses. The hole remains permanent. The treatment is short, since the distressing symptoms soon cease and the secretion becomes scant. On account of the lachrymal duct the hole must be made behind the maxillary foramen. The introduction of instruments into the frontal sinus can be controlled by the Roentgen rays.

VOHSEN : In spite of the slight danger for the brain, empyema of the sinus must be cured, on account of the lungs (inspiration), and the stomach (swallowing of pus). We ought to operate in such a way that we see what we do. I make small holes allowing endoscopy. In very deep frontal sinuses the scars are disfiguring. V. demonstrates instruments for transillumination.

ZARNIKO calls attention to the disappointment following the results formerly expected from these operations. Extranasal procedures cannot be discarded. He saw a large number of recoveries due to them alone. The after-treatment is most important, just as in middle-ear operations. Any tamponing causes irritation—also Jansen's obturator. It is generally conceded that the establishment of an outer opening may be delayed for a long time, and this is the chief result of the discussion.

KILLIAN : The practice of rhinoscopic media is safer, better, and less dangerous than the palpation with the finger as recommended by others.

DENKER : Contribution to the anatomy of the hearing organ of monotremata.

SIEBENMANN : 1. New investigations on Corti's membrane.

2. Microscopic sections of the petrous bone of a deaf-mute. Cochlea normal, except total absence of Corti's organ, only on one place of the middle turn a rudiment of it ; the narrow marginal zone is slightly developed. Where Corti's organ ought to be, the membrane is displaced downwards over the great

epithelial ridge and almost fills the internal spiral sulcus. The epithelium of the macula acustica, the utricle, and saccule is preserved. Apparently deaf-mutism was caused by this defect.

HARTMANN : On irregular development of the frontal cells.

H. gained a clear view of the complicated conditions of the anterior ethmoid cells from the embryological investigations, especially of Killian, whom he asks to explain the embryological conditions on his illustrations.

KILLIAN found on five hundred half-skulls of human embryos, that in early stages of development the nose contains six turbinated bodies. The uncinate process is also a rudiment of a turbinate. From the fissures between the three upper turbinated bodies, three ethmoid cells develop. There are still many additional turbinates, one in the upper and many in the middle meatus. Three upper and three lower succenturiate turbinates with their fissures are found regularly, from which the frontal sinus and the bulla ethmoidalis develop.

Hartmann demonstrates the arrangement of the cells in adults partly in specimens, partly by pictures of his atlas just published : defects of the cells, regular arrangement, and several specimens of irregular arrangement of the cells, which can be also explained by the normal type. The frontal sinus shows three cells, an anterior, lateral, and posterior ; the ostium of the frontal sinus always is on the medial side of the ostia of the cells. H. demonstrates the hernious development of the frontal sinus, as he called it, in a specimen.

BEZOLD : An analysis of Rinne's experiment.

Bezold maintains his views on the significance and value of Rinne's experiment with reference to the views expressed by Zimmermann, of Dresden, at the previous congress of the Society and more fully in a paper published in the German edition of these ARCHIVES. Both articles will be translated and published in our next issue. There was a discussion which Bloch ended by the remark : " The well-ascertained results of our methods of examination render a discussion superfluous."

MEETING JUNE 2d, AT 9 A.M.

PASSOW : Exhibition of patients.

Passow demonstrates several cases ; in one of these the lower labyrinthine wall had been trephined to evacuate suspected pus. A

canal, 4 *cm* in length, was reached running inwards along the base of the skull. Even now, after several months, pus oozes, the source of which is doubtful.

HARTMANN advocates the appointment of a committee for anatomo-pathological examinations of deaf-mutes, to which specimens may be sent with histories by any observer who has not the time or means to examine them himself. A committee of five is appointed.

SCHWENDT: Determination of number of vibrations with Kundt's dust figures. S. tested the various Galton pipes with Kundt's dust figures under manometric pressure as to their pitch and upper tones. Edelmann's Galton pipe is rich in the latter. According to acoustic laws, their proportion to the basal tone is 3:1. In a certain width of the mouthpiece and constant air-pressure, the upper tones cannot be made out, which is of practical importance. The latest pipe of Edelmann's yields higher tones than the former. In the harmonica of Urbantschitsch, upper tones from c^1 to c^2 can be demonstrated by the dust figures. Finally the dust figures of different tones of Galton pipes, in harmonic proportion, are shown in Kundt's tubes.

Discussion.—BEZOLD: Edelmann does not perfectly agree with the investigations of Schwendt.

WANNER: On shortening of the bone-conduction after traumatism of the skull.

The following observation leads me to a preliminary communication: A man fractured his frontal bone; healing in of a bone fragment with deep depression. Nine months afterwards he stayed in a psychiatric clinic for two weeks. With Roentgen rays a dark spot of the size of a hand was found at the scar. This and vertigo (especially in bending forward), headache, pricking, roaring, fatigue, obliviousness, intolerance of alcohol, intense swelling of the retinal veins, led to the diagnosis: narrowing of the capacity of the skull by chronic thickening of the meninges. Air conduction normal, bone-conduction much diminished. Diagnosis: callous and extensive adhesions between bone and dura. In looking for similar cases W. found one of epilepsy with chronic alcohol-neuritis after old traumatism, where also the bone-conduction was diminished, Rinne's experiment prolonged; the post-mortem examination revealed extensive adherence of the thickened dura to the skull. Several other cases of injury and some of intense alcoholism exhibited the same symptoms at the hearing test.

Discussion.—BEZOLD: I also examined the first case, which showed the same condition of hearing as in severe affections of the inner ear.

BLOCH: On the **etiology of adenoid vegetations.**

Adenoid vegetations, *i. e.*, the non-acute inflammatory hypertrophy of the pharyngeal tonsil in children, are chiefly hereditary, as was made known by W. Meyer, Loewenberg, and Simon; still more exact studies are lacking. They would require the examinations of a larger number of generations of the same family. This cannot be done very well if we wish to examine the nasopharynx in all cases. If we consider the peculiar formation of the face, as found associated with adenoids, as a sufficient pathognomonic symptom of the presence of a large pharyngeal tonsil, we may infer the heredity from pictures. As other obstructing affections of the naso-pharynx are extremely rare in childhood, I think we may diagnose adenoid vegetations from the so-called adenoid type of the face, as large lower lip hanging down, short and thin upper lip (rarely both thickened), the leptoprosopic appearance, wide palpebral fissure, broadened osseous dorsum nasi with relative or absolute narrowing of the alæ.

Several pictures from different stages of life are necessary to determine whether a family member belongs to that type. (B. shows the picture of a girl, normal at fifteen, marked adenoid at twenty-five years.) Pictures which show features voluntarily influenced must be excluded (lips pressed together). From such a formation of the face we may deduce hereditary adenoids in the family of Emperor Carl V., of whose family pictures for a space of more than half a millennium are preserved. The adenoid type of Carl V. is known (W. Meyer) and proven in his brother Ferdinand I. by R. Kayser from a picture painted by Lucas van Leyden. B. traced on pictures the heredity of this type in the genealogy of Carl and Ferdinand, and on more than one hundred pictures, collected within three years, he could prove it back to the first half of the fourteenth century and onward to the year 1700. From there the adenoid physiognomy ceases (demonstration).

Discussion.—SIEBENMANN: Adenoid face is an abbreviation of expression, not an anthropological term. Narrow nose, open mouth, prominent lower jaw, sometimes prognathly causing imperfect union of teeth, are not always associated with hypertrophic pharyngeal tonsil; it is generally only medium-sized. I

would not indiscriminately apply the expression adenoid face to the pictures demonstrated.

BRIEGER: I do not attribute such importance to heredity in adenoid vegetations, although the latter is apparent if members of the same family are simultaneously affected by them. Tuberculosis, hereditary syphilis, leukæmia, may present the aspect of hypertrophy of the pharyngeal tonsil.

BECKMANN: Hypertrophy of the pharyngeal tonsil and adenoid vegetations must not be confounded. With hypertrophic pharyngeal tonsil, a face with broad dorsum nasi, not narrow nose, is associated. I do not consider the Hapsburg face as such. The pharyngeal tonsil produces all kinds of inflammations of the upper air passages; and here lies its importance.

BARTH: Measurements of skulls of different races showed that this form of the face occurs more frequently with than without adenoids. The shape of the face does not depend upon that of the skull; the length and height of the palate must in statistics not be considered of equal value in adults and children.

KOERNER: The shape of the face should be considered in genealogical tables, which, however, can be carried through in three generations at the highest. In my own family, which is not adenoid, one person who married into it is adenoid and all his children.

BLOCH: The object of my paper was to stimulate investigations in families. I also saw a change in the type of the face by intermarriage with non-adenoid persons, but a recurrence of it in later generations.

MANASSE: Demonstration of microscopic specimens of **so-called ankylosis of the stapes of both petrous bones** of a man aged fifty-two. The right circular ligament is partially ossified; almost half of the cochlear capsule is covered by spongioid masses. The plate of the left stapes is completely adherent to the foramen ovale and changed to spongy bone; the border of stapes and bone cannot be distinguished. The process is rather recent, as medullary spaces and Howship's lacunæ are present. Sections of another case showed ankylosis by calcification at the margin of the oval window without ossification.

HANSBERG: Demonstration of the specimen of an **abscess of the temporal lobe**, with clinical history. The case showed only shortly before death severe focal symptoms, although a larger

number of old cerebral abscesses were present in the middle and posterior cranial fossæ. The process had started in the latter.

MEETING JUNE 2D, AT 1 P.M.

VIERECK: Ligation of the internal jugular vein in operating for thrombosis of the sinus is not yet generally adapted on account of some slight danger connected with it and impeding the outflow of the facial and cranial veins. Therefore its beneficial effect ought to be set forth by large statistics, from which, however, must be excluded: death from other causes, from meningitis and cerebral abscess, delayed operation, previous metastases, and ligating the thrombosed vein. According to this principle, Viereck collected 108 cases out of 170, of which 94 showed uncomplicated thrombosis of the sinus, 14 thrombosis of sinus and jugular vein. In 40 of the former the jugular vein was tied, in the remaining 54 not. The results were:

Ninety-four cases of uncomplicated thrombosis of the sinus.

	40 with ligation	54 without ligation
Died from pyæmia	6 = 15%	13 = 24%
Cured:	34 = 85%	41 = 76%
Of these were		
Cured without complications	28 = 70%	14 = 46%
With fever or metastases	6 = 30%	27 = 54%

Fourteen cases with thrombosis of sinus and jugular vein.

	14 with ligation	2 without ligation
Cured without complications	12 cases	0
With metastases	0	2 cases

After reporting a number of cases from the clinic at Leipzig and carefully criticising various considerations with regard to ligation, Viereck sums up: Ligation prevents pyæmic infection with greater safety than simple opening of the sinus. Therefore it ought always to precede the latter. Thus breaking of thrombi and aspiration of air are not to be feared.

Discussion: See below.

WEIL: Contribution to the clinical knowledge of otogenous pyæmia. Boy, aged thirteen, after removal of pharyngeal tonsil—acute right otitis media, mastoiditis, opening of mastoid; however, pyæmia, formation of sequestra, erosion of the wall of the sinus, frequent hemorrhages; tamponing, after which the temperature always rose. Complete recovery in five months.

KEIMER : Extradural abscess of the middle and posterior cranial fossæ with diagnosis difficult. Acute otitis media, violent pain, severe general symptoms. Opening of mastoid, a focus of the size of a bean, small antrum filled with pus, temperature fell to normal. Very intensive intermittent headache with nystagmus. In the fifth week œdema in and behind petrous bone. Trephining : Removal of the upper wall of meatus, evacuation of an extradural abscess from the middle cranial fossa, and, after enlarging the wound of the bone, also of the posterior fossa. Recovery. Final hearing, 6 *cm* for whisper.

Discussion.—**BARTH :** Hemorrhages from such wounds do not always come from the sinus, but from the smaller veins which are under high pressure.

MANASSE : Extradural abscesses may exist without any symptoms, which were marked only in three of my fifteen cases.

The ligation of the jugular vein is no matter of predilection. Statistics must consider the time between commencement of thrombosis of the sinus and ligation. The earlier the latter is done, the better the prognosis. Those operated upon on the first day all recovered. Of my cases of ligation of the jugular vein only one was saved.

KÜMMEL : Each case is a study for itself. If a solid thrombus is found in the sinus, we may wait and ligate at a second sitting. A thrombus in the jugular vein may be forced into the lungs during ligation ; feeling of pressure and dysphagia are no indications for ligation, but the first sign of metastasis in the lungs is. Then the vein must be incised and resected in its whole length.

JENS : In a case of necrosis following a mastoid operation I could elicit nystagmus by touching the granulations at the upper wall of the wound.

JANSEN : The jugular vein is only to be tied when diseased or when it contains an infected thrombus. The headache in extradural abscess is of neuralgic character, but exacerbates regularly at night. Nystagmus occurs rarely.

ESCHWEILER : The large calibre of the sinus explains the pressure which causes the blood to squirt. The assumption of an abnormally high blood-pressure in such cases is not necessary.

SCHEIBE : The prognosis depends upon the quality of pus and whether a case is acute or chronic. If symptoms of otitic pyæmia arise, the middle ear must be thoroughly scraped even in acute cases.

BARTH: If the sinus looks diseased, the jugular vein must also be exposed, since it may contain pus, even without thrombus, in its lumen or wall. It is tied twice and the upper portion incised.

JANSEN: The fever always originates in the circulation, *i. e.*, the sinus and its central continuations. Thus the middle ear requires no further attention. Yellow discoloration of the sinus wall is unimportant; the explorative puncture is determining, but not as to the existence of a parietal thrombus. The latter may be loosened by chiselling. If we are convinced of its existence, which is scarcely possible, the internal jugular vein should be ligated.

BARTH: Ligation of the jugular vein should always precede the opening of the sinus.

BRIEGER: The middle-ear affection may have been cured and still pyæmia may occur.

WEIL: I could leave the tympanic cavity intact in my case, not only for the reasons just mentioned, but also on account of sufficient drainage.

SCHIEBE: Necrosis of the mastoid in acute otitis media.

Acute suppurations of the middle ear are followed by otitis; chronic, by necrosis of the bone. Special dispositions produce necrosis after acute suppurations, as youthful age, particularly childhood. In adults disturbances of nutrition act that way. This is proved by 53 cases of acute otitis media operated upon by me. Necrosis developed in 6 cases after, in 7 before, operation. All showed disturbances of nutrition: 5 tuberculosis of the lungs, 5 sepsis, 2 diabetes. The bacteriological examinations revealed in 7 streptococcus pyogenes, 1 simultaneously staphylococcus, 2 staphylococcus, 1 ozæna bacillus. Diplococcus pneumoniae, otherwise common in acute otitis, was not found. I call the bone necrotic if it is bare and shows white discoloration. Results: In 5 of the 7 necroses before operation no sequestra separated except in 2; in the 6 necroses after operation the necrosis lasted until death. In 6 the wound remained completely open, in 3 partially. The 40 cases not complicated by necrosis healed all except 3 which died from intercurrent diseases. The average time of healing was 7 weeks for the 40, 14 for the 13. The prognosis of an aural suppuration, therefore, depends on the existence and nature of disturbances of nutrition.

Discussion.—EULENSTEIN is treating at present a case with a mummified bare piece of bone after subsidence of suppuration.

FRIEDRICH also found in a case of ozæna, ozæna bacilli in pus from the ears.

KREBS: Childhood predisposes very much to necrosis; especially children with hereditary syphilis present serious cases.

DREYFUSS: The ozæna bacillus is not yet certainly determined, perhaps it is identical with the bacillus of Friedländer.

SPORLEDER: Demonstrations: 1. Sclerosis of the auditory nerve after typhoid with hearing tests and microscopical sections. 2. Acute fatty degeneration of the trunk of the auditory nerve and atrophy of the cochlear nerve.

LAUTENSCHLÄGER: Demonstration of an apparatus for the treatment of the ear with dry air for the shrinking of granulations and drying the cavity after radical operations, and in perforations of the *Mt* instead of powder.

RUDLOFF: On the perforation of the nasal septum in people working with chrome. After discussing the opinions so far in vogue, R. reports his observations on a large number of employés in a factory at Biebrich. He found the seat of perforation behind the line where the pavement epithelium ceases, which grows from outside about 1 cm into the nose. Thus the pavement epithelium protects against cauterization. On the first day a grayish-white spot of $\frac{1}{2}$ to 1 cm in diameter is found, which spreads and leads to perforation sometimes as early as the second day. Some had epistaxis on the first day; holes were found on the seventh day. After working one year in the factory no laborer was found healthy; after leaving, the ulcers healed. The perforation spreads towards the back of the nose, but the latter does not sink in; a small bridge is preserved above. The process does not always stop at the end of the bone; it also spreads to the lateral wall of the nose, causing ulcers of the mucous membrane. A connection of the disease with erosions or wounds of the skin could not be found. The width of the nose is without influence. But the cornified epithelium at the anterior extremity of the lower turbinated body furnishes a protection, so that only the portions covered with ciliated epithelium are invaded. The cause is undoubtedly not traumatic; which shows the regular occurrence always at the same place and the extension to regions of the septum and lateral wall inaccessible to the finger.

HANSBERG : Contribution to the operation for abscess of the temporal lobe. In two cases, in which the opening of the abscess from the tegmen tympani did not effect sufficient drainage, the latter was obtained by a counter-opening through the squama, as proven in one case by the autopsy.

After the chairman had extended his thanks to the magistrate of Heidelberg, the local committee, and the members, the Society adjourned at 4 P.M. Ninety-three members were present.

REPORT OF THE SECTION ON OTOTOLOGY AND RHINOLOGY AT THE THIRTEENTH INTERNATIONAL MEDICAL CONGRESS, PARIS, AUGUST 2-9, 1900.

BY DR. M. BELLIN, IN THE "GAZETTE DES HÔPITAUX."¹

Translated by Dr. ARNOLD KNAPP.

Dr. GELLÉ, president of the Otological Congress, delivered the introductory address, and Professor POLITZER pronounced a eulogy on the celebrated Belgian otologist, Delstanche. The first question of the day was on **acoumetric notation, a project of unification.**

Reports were read by SCHIFFERS (Liège) and HARTMANN (Berlin). Hearing tests in general seek to localize the aural lesion and to determine the auditory acuity. In the former case the tests are not of equal value; in the latter the difficulties are great, for two reasons: the first and physical one, perception of sound takes place by the solid or bony way and by the aerial; the second and psycho-physiological, the ear is especially trained by education to perceive articulate speech. In addition, a discerning and analytical faculty is present, a differentiation of complex sounds of the various words in a spoken sentence. It is very difficult to notate the latter in a simple and clear manner.

The various methods and instruments employed by aurists were then described. Schiffers's conclusions, to which Hartmann also arrives, are the following:

1. The watch and all kinds of acoumeters without gradation cannot serve for the minimal fundamental notation; moreover, as the intensity varies with the distance, this procedure cannot be used to test contact hearing.

¹ In order to furnish our readers with an early report, we took the exceptional liberty of translating the elaborate report of Dr. Bellin in the *Gazette des Hôpitaux*, le 21 Août, 1900.

2. The tuning-fork is the best instrument to measure the hearing. The optical method is a decided step in advance, probably capable of further development.

3. The hearing acuity measured by tuning-fork is expressed by a fraction where the numerator denotes the duration of hearing in seconds and the denominator gives the normal-hearing duration. It is of course necessary to mention the tuning-fork employed.

4. Weber's test retains all the value previously given to it.

5. Rinne's test should be modified in that the base of the fork should be held in front of the otoscopic tube, so that the comparison between air- and bone-conduction be exact.

6. Examination with speech is very important. It is sufficient to test the hearing of vowels and consonants with a whispering voice, excluding the sibilants and using the residual respiratory air after several deep inspirations to obtain a uniform articulation. The letters or words employed should be noted and the distance at which they are heard.

Dr. P. BONNIER recommends the use of a standard acoumetric tuning-fork, with one hundred complete vibrations per second, which is equally suited to test the hearing on contact and by air-conduction. This fork corresponds solely to a decimal unit of time. The ordinary clinical tests show only the relation of ill-defined physiometric quantities. The author proposes to replace them by an exact measure of sensory amplitudes, which can be directly compared from day to day, by measuring daily air- and bone-conduction with the same standards, and comparing one to the other. In Rinne's test, air perception should be measured by applying the foot of the fork on the otoscopic tube. At the London Congress, in 1899, Bonnier described his "*pointure acoumétrique*"—that is, the equation of air perception and immediate paracousis (mastoid) and distant paracousis (knee) of one and the other side. The optical method of measuring consists of a small mark placed on one of the branches of the fork showing a very fine marking. When the vibrations die out and the eye ceases to see the marking, this is the acoumetric O. The patient ceases to hear the sound (over the tube, the mastoid, or the knee) N seconds before this image disappears; the negative hearing in the first case and the positive in the second would be $-N$ and $+N$.

A committee, composed of Politzer, Schiffrs, and Bonnier, was

selected to present a report on this subject at the next Otological Congress.

Dr. PANZER found the following lesions in **acute otitis media** : The mucous membrane of the tympanum is thickened, the result of a round-celled infiltration, greatest in the superficial layers ; the mucous membrane forms cushions in the anterior part like a finger of a glove. There are exudates and granulations between the ossicles and the walls of the attic. The mucous membrane of the antrum is infiltrated with round cells.

Several communications were made on the important question of the **treatment of chronic purulent otitis**.

HEIMAN (Warsaw) recommends conservative treatment at the beginning, except when indications for surgical intervention are present.

These indications are as follows : In the presence of menacing symptoms of endocranial or general infection, and especially when these symptoms have already begun, operation is absolutely indicated ; likewise in cholesteatoma, caries of the temporal bone where treatment through the canal has been unavailing, in cases of retention of pus where there is a painful infiltration of the mastoid process, or in bony fistulæ, or in congestive abscesses if the patient's condition be good. The mastoid process must be opened, or the Stacke operation performed, according to the extent and situation of the morbid process.

The operation is contra-indicated when the suppuration depends exclusively on a morbid process of the tympanic mucous membrane.

Dr. MIOT lays great weight on the wet dressing in chronic purulent otitis, the dry dressing only being used when the discharge is very much diminished. A prolonged sojourn at the sea-coast is very advantageous. From a surgical aspect he insists upon the advantages of ossiculectomy, which permits treatment of the attic ; the antrum frequently heals without other intervention.

In cholesteatoma, Miot performs the Stacke-Küster method, with the modification of preserving the ossicular chain, if the latter be healthy and it is possible to do so.

Dr. VACHER described a new operative procedure for removing the ossicles and curetting the attic. This is usually performed through the canal, if the latter is large, or else after detaching the auricle and canal. The superior half of the membranous canal is detached and carried outward by two horizontal incisions, the

one anterior, the other posterior, from the depth of the canal and carried down to the bone and out to the auricle. This flap is then detached and withdrawn, so that the upper half of the bony canal is exposed. This opening is sufficient for removal of the ossicles, curettage of the attic after removing the wall of the ossicular chain with Stacke's choroid gouge. The entire upper wall of the canal can be thus removed. This method has given very satisfactory results in the hands of Vacher.

Dr. RUAULT (Nancy) describes two varieties of **paratympanic fistulæ**, caused by a tympanic suppuration which, after extending to the antrum and the mastoid cells, has ceased in the tympanum, but continued in the latter cavities. These openings continue to suppurate either by postero-inferior fistulæ due to opening of the inferior mastoid cells, which may alone be affected when the antrum does not participate or does not exist; these fistulæ are usually situated in the outer part of the bony canal, at a distance from the drum-membrane.

The postero-superior fistulæ, due to necrosis of the lower wall of the antrum or of the upper cells, are situated near the drum-membrane. In this variety healing may take place spontaneously by the same process that we follow in the operation on the middle-ear cavities.

Dr. MOURE calls attention to the fact that the lesion usually described as occurring in a **Bezold's mastoiditis** never occurs alone. It is accompanied by a perforation of the inner table, usually at the level of the sinus, more rarely near the upper part of the antrum, or in the bony auditory canal, and most rarely externally.

When the Bezold mastoiditis is well marked, when there is a purulent collection in the neck, the meninges are bathed in pus and granulations; this is not, however, an absolute rule. The changes occurring in the interior of the mastoid toward the meninges must not be lost sight of. After curetting thoroughly, the wound is closed, except for a drain which abbreviates the treatment generally.

Professor GUYE (Amsterdam) described some anatomical details concerning the **etiology** of Bezold's mastoiditis. With the aid of L. BOLK he examined 420 skulls for persistence of the petro-squamous suture. In one case the suture was found open for three quarters of its length; remnants on both sides were found in 7 cases, on the right only in 4, on left in 3, making a total of 7 in 100.

A specimen of a part of a mastoid process removed during operation of a case of Bezold's mastoiditis was demonstrated. On one side there was an open cell communicating externally by two small vascular orifices, admitting the hairs of a brush, through which the infection had passed to the neck.

Dr. MOLINIÉ has studied the important group of cases of **mastoiditis** which were **not operated upon** with the following conclusions: 1. Acute mastoiditis may be cured definitely with the disappearance of all inflammatory signs, either spontaneously or under the influence of medical treatment. 2. Mastoiditis may heal by spontaneous opening, a very rare event; a fistula remaining is the rule. 3. Mastoiditis discharges through its internal surface the pus descending in the vascular sheath to open spontaneously in the form of a cervical abscess. 4. The spontaneous fistula may subsequently be healed by epidermization of the fistulous tract, by cicatrization or closure of this tract. These are rare terminations and have little influence on the grave prognosis of mastoiditis which has been left to itself or treated medically.

Dr. MÉNIÈRE read a paper on **mastoiditis in children**, and concludes as follows: 1. Mastoiditis following acute purulent otitis is more rare in children (8 in 1103 cases) than in adults (33 in 438 cases). 2. Mastoiditis complicating chronic purulent otitis is frequent (356 in 1748 cases). 3. The mastoid process is formed during the first years by the slow resorption of cancellous bone; the slow, painless, and insidious progress of affections of the mastoid cells may be explained. 4. Caries attacking the cells from without inward without lesions of the tympanum is not rare in young patients (32 cases). 5. The extension of mastoid caries from the interior to the exterior without pain or symptom is frequently observed in predisposed young subjects where the otorrhœa has not been properly treated. 6. Caries followed by necrosis and the formation of sequestra is not very rare among children (34 in 1748 cases). The sequestra are readily cast off, without any neighboring complication in the course of the disease. 7. Complications are rare in children, as extra- or intra-dural abscess, sinus thrombosis, etc. (0 in 2651 acute and chronic cases). 8. Notwithstanding the benignity of the diverse mastoid complications in children, if proper care, methodic cleansing, etc., are without avail, and do not check the progress of the suppuration, recourse must be had to (a) removal of the ossicles which are carious and keep up the discharge; (b) if this is not sufficient the mastoid should be opened, and, if necessary, combined with

exposure of the middle ear. Such a radical procedure is necessary because experience has shown that mastoid infection occurs insidiously and slowly and does not give any diagnostic symptoms.

Dr. POLI (Gênes) draws attention to the following fact which he has observed in the course of a mastoid empyema. The pus after reaching the sigmoid groove made its way to the surface of the bone without producing severe symptoms in the sigmoid sinus.

Dr. LAURENS reported a rare complication of aural suppuration. It was a case of diffuse cranial otitis with thrombophlebitis of the diploic veins in an old woman of sixty-six suffering from an ordinary mastoiditis. At the operation pus was seen coming from mastoid cells, extending into the occipital bone. Canals communicated with these cells, which proved to be diploic channels whose walls, formed by the external and internal tables of the skull, were the seat of an otitis. They contained a vein which terminated in a cul-de-sac or anastomized with others. Each one contained a blood clot or pus. The lesions were so extensive that the external surface of the skull had to be exposed from the frontal to the occipital bones, and from the vertex to the base. All sutures were invaded by the suppurating process. There were no special symptoms, and no evidence of septico-pyæmia in this thrombo-phlebitis limited by the lateral and superior longitudinal sinuses.

The diagnosis and treatment of otitic pyæmia, by DUNDAS GRANT (London).

The diagnosis of otitic pyæmia rests on pyæmic signs in general, combined with an acute or chronic inflammation of the middle ear or surrounding bone. The most important symptoms are repeated chills, sudden and large variations in temperature, metastases in the large or small circulation. It is necessary to eliminate disease with similar symptoms, as typhoid fever, malaria, acute articular rheumatism, infectious endocarditis, acute tuberculosis, and meningitis.

These general symptoms may also depend on brain abscess or meningitis, complications which may exist at the same time with pyæmia. The diagnosis of pyæmia being made, it remains to be confirmed whether this pyæmia is accompanied or not by thrombosis. If the symptoms supervene to an acute otitis and metastases are present in the general circulation, it is probably pyæmia without thrombosis; if they follow a chronic otorrhœa

of at least a year's standing, and are accompanied by pulmonary or pleural metastases, a thrombosis may be presupposed.

The diagnosis is even more probable if the jugular is transformed into a painful cord, hard. A swelling of the orbital contents, with dilatation of the retinal veins, suggests a thrombosis of the cavernous sinus. If the retro-mastoid region is tender, the condyloid or retinal veins are probably invaded. An exact diagnosis can only be made when the sigmoid sinus is exposed; absence of fluctuation between the sigmoid sinus and the internal jugular vein indicates a complete obstruction. A puncture may reveal pus; a negative puncture, a thrombosis; if blood is aspirated, a parietal thrombus may be present.

The diagnosis made, what is the treatment? It is first of all necessary to obliterate the source of infection and all secondary foci; the transportation of septic materials must be prevented, and the general health of the patient kept up.

In acute cases: incision of the drum, opening of the mastoid cells; the metastatic abscesses must be opened as they form. If, notwithstanding, the symptoms persist, the jugular should be ligated, the sigmoid sinus opened and cleansed. The jugular should not be ligated unless the sinus is opened at the same time.

In chronic cases, the radical mastoid operation should be performed, preceded or followed by ligation of the jugular in case of thrombosis. If the thrombosis has become purulent, the sinus must be widely opened until a healthy-looking clot is reached. If the chills should continue, the sinus must be still farther exposed until bleeding is established from both ends.

In thrombosis of the jugular vein, the ligature must be applied as low down as possible, the vein divided and the upper end brought out at the upper end of the wound, and the contents evacuated by a curette or syringe. If the vein is not thrombosed, the ligation is made high up and the trunk not divided. Any involuntary wounding of the sinus should be avoided, as severe symptoms may follow.

Every tampon placed in the sinus must be removed as soon as possible, even at the end of twenty-four hours.

When the pyæmia seems complicated with meningitis, lumbar puncture should be made. If the liquid contains pus corpuscles, all operations are useless; but if a serous meningitis seems to be present, the indication for operation is more pronounced.

A complicating brain abscess must be evacuated by an opening in the skull as far distant as possible from the affected sinus.

The mastoid vein may alone be thrombosed. Dr. Laurens has reported an example of this rare condition occurring in the course of an old otorrhœa. Pain and swelling were present back of the mastoid, with general pyæmic symptoms. Abscess of the back of the neck frequently follows. The mastoid should be opened, the vein and sinus exposed, the jugular ligated, and the infectious focus destroyed.

Dr. ZAALBERG (Amsterdam) reported a curious case of **otitic pyæmia** without thrombosis of the lateral sinus, terminating in recovery.

Drs. STANCULÉANU and BAUP described several cases of **aural infection** with or without **thrombo-phlebitis**. In the first group, there was a case of septicæmia with hypothermia due to the colon bacillus; in the second group, cases of fatal septicæmia due to streptococcus. They observed, following benign otitis media, a case of infectious pseudo-rheumatism and one of mental confusion.

Dr. COLLORIET (Paris) concluded from two observations that in cases of meningitis of aural origin one must intervene to endeavor to remove the source of infection. The dura mater, however, must not be attacked unless the extent of the lesions or phenomena of cerebral localization warrant it. Urgent intervention is indicated in brain abscess even with symptoms not more definite than nausea, headache, localized pain, and though the general condition be good.

Surgical treatment of otitic sclerosis. Prof. SIEBENMANN (Bâle) came to the following conclusions: Intervention can only be of value in cases with changes due to a suppurative otitis or in catarrh of the hypertrophic form, though the results in the latter are uncertain. The juvenile form of progressive deafness begins usually between the ages of ten to twenty or twenty to thirty. The lesions consist in the formation of one or more cancellous foci in the osseous substance of the labyrinth capsule. One of the first changes is the fixation of the stapes by a process of ossification which advances forward and inward to the extremity of the cochlear canal. Isolated foci may be present in the spiral lamina and produce the signs of nervous deafness either by physical or chemical changes in the lymph or perilymph, or by compressing the cochlear nerve. To treat these cancellous foci

in the labyrinthine capsule surgically, it would be necessary at the beginning to remove so much of the diseased bone that a large part of the cochlea is opened and destroyed.

Dr. RICARD BOTEY (Barcelona) arrived at similar conclusions. To justify operation, cranial perception of the watch must be preserved. Rinne must be negative on the affected side and perforation of the drum improve hearing. The author condemns all operations on the ossicles as without permanent results. Owing to the anatomical changes in sclerosis, surgical treatment must be of dubious value. Dr. Miot shares these views only in cases of panotitis. In the deafness from muscular insufficiency of the muscles of the middle ear and Eustachian tube, the mobilization of the ossicles or their extraction gives good results.

Dr. MALHERBE (Paris) has more advanced views on this subject and regards the surgical treatment of sclerosis with favor, basing his opinion on sixty cases of dry otitis media treated by the petro-mastoid operation.

In forty-one cases the sclerosis was secondary to catarrhal tubo-tympanitis or to middle-ear suppuration; the corresponding results were always very good.

In nineteen other cases the sclerosis was primary. The results varied with degree of involvement of the labyrinth. In two cases they were good, in six moderate, in five poor. These last five cases presented an advanced degree of labyrinthine sclerosis; the improvement after operation increased for some time, then it remained stationary. In these cases five had been operated on in both ears; the results were as successful on one as on the other side. The second operation may be done as soon as the patient has completely recovered from the first.

The author has a new grouping of the dry catarrhs in two groups: 1st. Interstitial hypertrophic tubo-tympanitis subsequent to catarrhal lesions propagated by the tube. 2d. Atrophic sclerosed antro-tympanitis where the malady begins in the middle ear and tympanum and changes immediately to sclerosis. He further speaks of rhino-salpingitis, pharyngo-salpingitis, and a combined form. In the large group of primary sclerosis he describes a congenital type of early and rapid sclerosis in young women and calls it precocious adhesive tympanitis.

The extreme views of Malherbe are not shared by other French otologists, whose opinion is voiced as follows by Dr. LAURENS:

I have never operated on cases of sclerosis, because the cases so

treated by Dr. Malherbe which I have seen seemed to have derived no benefit from the operation, and in one the operation was followed by vertigo, which had not existed before, and in another otorrhœa set in. The subjective noises not connected with the sclerosis are capable of improvement; those, however, which are dependent on this affection are often rebellious. Drs. Cuvillier and Vassal have had good results with revulsive methods practised on the mastoid process, tincture of iodine, frictions, vesicants, and the actual cautery. Bromide and iodide of potassium combined remain the most valuable remedial agents.

Dr. Suarez de Mendoza considers long-continued massage of the tympanum as susceptible of relieving the noises in sclerosis.

Cause and treatment of Ménière's disease by Dr. MOLL (Arnheim). Ménière's disease, or Ménière's syndrome, consists of vertigo, tinnitus, partial or complete deafness, with nausea or vomiting. Aural vertigo is to-day well known; it arises from an affection, transient or permanent, of the labyrinth; primary if there is an intralabyrinthine lesion, secondary if there is only an increase of intralabyrinthine pressure, an abnormal compression following lesions of the middle or external ear. As Ménière's disease presents itself in various forms, as it has not always the same origin, and as the symptoms are exactly the same when an affection of the other parts of the ear is present, it seems needless to retain the expression Ménière's disease for a single form. This symptom-syndrome may depend on a lesion of the external ear, of the middle or the internal ear, of the acoustic nerve.

Treatment varies with the cause. To quiet the labyrinthine hyperæsthesia, the sulphate of quinine is the favorite remedy, given in small doses; the hypodermic injection of pilocarpine (Politzer, Lucae); in case of syphilis the iodides; the bromides in the neurasthenics. The reflex trouble due to nasal or pharyngeal lesions must be considered and the latter treated.

Ménière's syndrome is an important symptom of toxic labyrinthitis, which disappears frequently completely when the cause ceases.

Dr. BAR (Nice) drew attention to the **trichophytosis** of the **external auditory canal** which gives a good prognosis.

Dr. GROSSARD (Paris) reports a very unusual case of **double repeating auricular hemorrhages** in a woman of sixty-three years with disturbed hearing.

Dr. JACQUES demonstrated some specimens, showing the **nervous terminations in the drum.**

Professor URBANTSCHITSCH (Vienna) examined deafness to determine if any hearing remained, and found that total deafness is very rare. The **methodical hearing exercises** have the effect of: (1) awakening the attention for acoustic impressions ; (2) the distinguishing by the hearing the meaning of what they hear ; (3) the gradual increase of acoustic sensibility.

Dr. SCHWENDT (Bâle) came to the same conclusions and added that this complementary education by the ear should not be carried on in neglect of lip-reading. To obtain the best results, the half deaf must be separated from the other deaf-mutes.

Drs. MARICHELE and DUFO DE GERMANE prefer the voice for the exercises and the phonograph for repeater. Dr. Gellé uses the micro-phonograph.

Dr. MADER (Munich) showed an instrument, the otomicrophone, to study the transmission of sound in the ear.

Dr. MAHN (Paris) demonstrated a very ingenious dilating speculum for the examination of the ear in cases of accidental stenosis of the canal.

REPORT OF THE MEETING OF THE NEW YORK
OTOLOGICAL SOCIETY OF MARCH 27, 1900.

By DR. H. A. ALDERTON, SECRETARY.

PRESIDENT, DR. C. J. KIPP, IN THE CHAIR.

Dr. MAX TOEPLITZ reported a case of **intermittent high temperature**, occurring about every other day three or four times; once so high as 106° F. The child had a swollen pharynx with a whitish spot upon the right tonsil. The child had suffered until January, 1900, from otorrhœa, which had left a perforation of the right membrana tympani. The consulted pædiatrist could not account for the high fever by the appearance of the throat, which did not look diphtheritic; he tried to blame the ear for it (probably retention of pus in the middle ear or mastoid). T. found the ear free from acute trouble and made cultures from the throat which proved to be pure cultures of staphylococcus pyogenes aureus. The temperature subsided spontaneously. T. thought that these infections of the throat with cocci deserved further study.

Discussion.—Dr. DENCH asked if staphylococci could produce such temperature? Dr. H. KNAPP thought they could. Since Wunderlich, the originator of clinical thermometry, acute pharyngitis, especially in children, has been noted for its inordinate fever.

Dr. J. F. MCKERNON reported further upon a case, formerly reported at a meeting in 1899, where he could not relieve **distressing tinnitus**. This case was cured by bougieing the Eustachian tube of the affected side, using the negative pole of a galvanic current by means of a gold bougie. The strength of the current was 30 volts, 3½ milliamp., contact 2½ minutes. The bougie was passed well into the tympanum and allowed to remain there for the above time. The tube was not strictured

throughout any part. Recovery was immediate and has remained so up to the present time. The electrolysis no doubt acted upon the middle-ear deposit, causing its absorption.

Discussion.—Dr. J. L. ADAMS asked if Dr. McKernon had ever had any inflammatory results following the application? McKERNON had had two cases of acute inflammation, healing in ten days or less. DENCH thought all these cases should be examined with forks of 16 v. s. to establish accurate lower-tone limit.

Dr. McKERNON reported a case of **recurrent mastoiditis** in a boy, nine years old, operated on in June, 1899, for mastoiditis: the usual operation, pus in the antrum, healed in about seven weeks with good hearing. In March, 1900, he received a blow on the side of the head just above the auricle. He was dizzy for five days, then complained of pain over and around region and side of head. Two weeks after the blow, was seen at clinic, and the scar in old wound was found bulging and discharging at the lower angle of the scar. He was again operated upon, and softened bone found all over inner table, with an extensive collection (epidural) of pus over both middle and posterior fossæ. The sinus was exposed for over an inch but was not affected. The wound healed slowly. It would seem hardly possible for the extensive re-involvement to occur in such a short period as that between the time of the blow and the second operation. There had been no complaint of headaches previously.

Discussion.—Dr. DENCH thought that the focus of pus was in the skull at the first operation and was reinfected as a result of the blow.

Dr. E. B. DENCH reported a case of **sinus thrombosis and cerebellar abscess** (full report of case in the last volume of the Transactions of the American Otological Society).

Dr. DENCH reported a case of **Bezold's mastoiditis, sinus thrombosis, and necrotic jugular vein**. The patient made a perfect recovery. The interesting point in connection with this case was, that owing to the necrotic condition of the vein, it was impossible to excise it. D., therefore, divided the vein between two ligatures, just below the jugular bulb, and again just above the clavicle. All tributary branches were also divided between two ligatures. The septic focus was, in this manner, completely isolated, but, as it was impossible to remove it, it was left in situ, being separated from the surrounding

structures by iodoform gauze. The wound was left open throughout its entire length.

Discussion.—Dr. J. L. ADAMS inquired if the infiltration of the neck was secondary to the phlebitis? Dr. DENCH: Yes.

Dr. F. WHITING reported a case of **sinus thrombosis**.

Dr. F. M. WILSON reported a case of **fugitive facial paralysis**. A young woman, after sitting by an open window, had, the next day, a slight facial paralysis of the left side. She also had enough pain and deafness in the left ear to make her quite uncomfortable. The left membrane was slightly red and the hearing reduced to $\frac{1}{4}$. Rest at home was the principal treatment and there was complete recovery in ten days. Dr. W. stated that cases of so-called fugitive facial paralysis are comparatively common, but aurists see very few of them because usually there are no aural symptoms. The accepted pathology of these cases is a neuritis in the Fallopian canal, caused by cold. It seems very strange that cold can cause neuritis in the Fallopian canal without, at the same time, causing other symptoms of mild tympanic inflammation.

Discussion.—Dr. DENCH thought the trouble in this case might have been due to a dehiscence in the wall of the Fallopian canal. They all recover. He had reported one case which had facial paralysis upon both sides, one side following the other, as a result of a mild otitis media purulenta acuta. Dr. H. KNAPP said that he had seen similar cases with almost no physical signs, except congestion of the drum-membrane. They were, however, duly described in otological periodicals, and but lately he had read an article in a French otological journal.

Present.—Drs. C. J. Kipp, H. Knapp, E. B. Dench, J. F. McKernon, M. Toeplitz, J. L. Adams, F. M. Wilson, A. Duane, F. Whiting. Dr. F. Whiting acted as secretary *pro tem*.

REPORT OF MEETING OF MAY 22, 1900.

Dr. E. GRUENING presented a patient. **A case of operation for perisinuous abscess, sinus thrombosis, and ligation of the jugular.** The patient had a **cerebral hernia** presenting through the operation wound.

Discussion.—Dr. H. KNAPP remarked that general surgeons commonly advised abscision. He had had a similar case with a very large hernia, and kept it aseptic by applications of boric acid

powder and aseptic gauze. There was no granulation tissue, but a second abscess. Gradually the hernia shrunk after evacuation of the second abscess and disappeared, leaving no trace in outward appearance or function. Dr. C. J. KIPP asked as to how the hernia happened to occur in Dr. Gruening's case. Dr. GRUENING answered that there was no trace of hernia when the patient left the hospital. It had appeared since, pushing forward the scar tissue. Apparently there was very little brain tissue present in the hernia. Dr. T. P. BERENS: Was there any breaking through of the dura at the operation? Dr. GRUENING: Apparently not. Dr. KIPP: Any fluid? Dr. GRUENING: No. Where the hernia has been abscised, there has occurred infection, and the patient has died in every case in which he has seen the surgeons do this. He had not been able to find any literature of a similar case of hernia following a simple mastoid operation. The mass came through the roof of the antrum. Dr. BACON asked whether Dr. G. would think well of the use of an elastic ligature. Dr. GRUENING: Yes. Dr. BACON asked if the bone was especially softened around the sinus. Dr. GRUENING answered no, that the bone was eburnated.

Dr. GORHAM BACON reported a case of **pre-auricular subperiosteal abscess following O.M.P.A., ending fatally.**

Boy, private patient, eight years old, with history of tuberculosis. Had an attack of tonsillitis several days before Dr. B. was called in to see him. B. first saw him in consultation April 21, 1900, and at that time he had some temperature with grippe symptoms and some pain in the left ear. He also complained of photophobia. On April 22d B. incised freely both drumheads, under nitrous oxide gas, as they were bulging. Patient seemed better after this, and B. was not called again till April 28th. At that time the left auricle was standing out from the head. Fluctuation detected above and in front of the auricle. The boy was anæsthetized and the abscess freely opened—also the antrum and mastoid cells. The mastoid was of the diploic variety and contained softened bone, granulations, and but little pus. This operation was performed on April 29th. Before the operation he complained of considerable pain over the eyes. This pain was relieved by the operation and for several days he seemed much better and was doing well. May 8th he was worse again—severe headache (frontal)—and very irritable. May 11th, B. opened **right** mastoid antrum and cells, as there was tenderness on press-

ure in this region. Same condition of bone found on this side. Some granulation tissue and a little pus. May 13th.—Boy again much better, and apparently all symptoms relieved by the operation. He seemed very happy and comfortable. May 15th.—Not so well. He began to complain of headache over his eyes; inclined to draw his head backwards, irritable, passes urine involuntarily at night. Temperature normal, pulse 120. May 16th.—Vomiting, irritable, drowsy; when aroused, pupils widely dilated and patient very much excited and with a terrified expression. Has been crying out all night; pulse slower, also respiration; at 7 P.M. he died suddenly, respiratory centre being paralyzed—pulse continued some time after respiration ceased. The temperature was practically normal throughout the disease after the first operation. No paralysis, no symptoms, except the headache, rapid pulse, and finally symptoms of meningitis.

Discussion.—Dr. A. H. KNAPP asked whether the nose had been examined. Dr. BACON said no. Dr. HEPBURN asked whether there had been any afternoon rises in temperature. Dr. BACON: No. Dr. HEPBURN thought that that would rather be against tubercular infection. There should be a P.M. temperature, even though slight.

Dr. R. LEWIS reported a **case of mastoiditis** following syringing for antrum-of-Highmore empyema.

Discussion.—Dr. GRUENING asked whether the auricles were swollen in this case. Dr. LEWIS said: Not at the time of the operation, but since. Dr. GRUENING had recently seen a similar case of simple mastoiditis, followed by swelling of the auricle. This is almost pathognomonic of erysipelas from mastoid operation. Dr. BACON had a case in which, in a simple mastoid case, white erysipelas occurred and the auricle was not involved. Dr. ALDERTON had recently had a case of sinus thrombosis, operated upon with ligation of the jugular, in which erysipelas occurred on the fourth day after operation, interfering but temporarily with the progress of recovery. Dr. TOEPLITZ had had a case complaining of tinnitus in right ear. There was a serous secretion. On the third and fourth days, chills. The mastoid was not involved. Erysipelas set in. On the fifth day the patient died. The culture showed staphylococcus pyogenes albus. No streptococcus. Patient had also diabetes and kidney trouble. Dr. BERENS had seen two cases of erysipelas following mastoid operation. In neither were the auricles involved. Dr. QUINLAN spoke of a case of erysipelas

occurring during an attack of Bezold's mastoiditis. Dr. KIPP operated upon a case in which erysipelas was present at the time of operation. The patient had head symptoms, making the operation necessary. Patient recovered, as have all the cases of erysipelas he had seen, but one.

Dr. LEWIS reported a case of stenosis of the external auditory meatus, operated upon with healing in thirty-one days.

Dr. ARNOLD KNAPP reported a case of otitis interna in a man forty-one years of age who had suffered from exophthalmic goitre for six years. The right ear had long been totally deaf, with a history of suppurative otitis after scarlet fever. On April 23, 1900, patient noticed that the voices about him grew fainter and he was seized with vertigo, tinnitus, and vomiting. The loss of hearing became total and the tinnitus was constant and very annoying. When seen two hours later he was very much excited, face cyanotic, pulse 140, and it was impossible to make him hear anything. Hot bath, salicylate of soda, and rest in bed were prescribed. On the following day the left *Mt* was examined and found somewhat retracted, Eustachian tubes free; no perception of sound, no bone-conduction, no high tones. Owing to the tachycardia and cyanosis, though the heart sounds seemed normal it was thought best not to administer pilocarpine. The salicylate of soda was continued; later calomel and then iodide of potassium were given; the Eustachian tubes were catheterized daily. April 25th, tinnitus and cyanosis less. Hears loudest voice at 6 inches from ear; urine was found normal. April 26th, condition better. C fork heard by air but not by bone. c^* negative. April 28th, loud voice at 1 foot; $H = \frac{1}{8} \text{ ft}$. C fork now heard by bone-conduction but very much shortened. c^* perceived, Galton negative. May 4th $H = \frac{3}{8} \text{ ft}$. Rinne negative; bone-conduction shortened. Galton 6 perceived. Low forks heard. Some tinnitus.

May 10th $V = \frac{3}{8} \text{ ft}$. Galton 6. Lower limit F. The patient has since continued to improve though it has not been possible to examine him again.

This case is of interest as being one of sudden total deafness in a patient suffering from exophthalmic goitre. The rapidity of improvement makes it likely to have been a circulatory disturbance of the labyrinth. The order of regaining the hearing-power could be well studied as the other ear was totally deaf.

Discussion.—Dr. BACON asked whether there was any kidney

complication. Dr. A. KNAPP answered that the urine was normal. Dr. KIPP asked whether Dr. K. was able entirely to exclude the hearing from the other side. Dr. A. KNAPP said he thought so. Dr. BERENS asked whether syphilis was present. Dr. A. KNAPP said he had not inquired. It was not feasible.

Dr. F. J. QUINLAN reported a **case of facial paralysis ascribed to gout.**

Young man, thirty-four years of age, awoke one morning and found his face paralyzed, with the symptoms of open eye, escape of liquids at meal times, some tenderness over mastoid tip, increased over region of antrum and middle plate; hearing slightly impaired, but well-marked tinnitus.* No history of syphilis; patient has always been in excellent health up to present illness. A provisional diagnosis of gouty neuritis was made. Calomel in small quantities was administered; but baths and abstinence from meat, enforced by long walks and active vigorous exercise, enjoined. Within three weeks paralysis had entirely disappeared and the patient's face showed very little evidence of recent striking condition.

Present.—Drs. C. J. Kipp, A. Duane, E. Gruening, G. Bacon, H. Knapp, R. Lewis, A. Knapp, F. J. Quinlan, J. E. Sheppard, T. P. Berens, N. J. Hepburn, J. B. Clemens, C. H. May, M. Toeplitz, H. A. Alderton.

REPORT ON THE PROGRESS IN OTOTOLOGY DURING THE FIRST QUARTER OF 1900.

(Concluded from page 342.)

By DR. ARTHUR HARTMANN.

Translated by Dr. ARNOLD KNAPP.

MIDDLE EAR.

a.—ACUTE OTITIS MEDIA.

44. JÜRGENS, G. The purulent processes of the ear, their causes and clinical varieties. *Monatschr. f. Ohrenheilk.*, No. 2, 1900, and *Wojenno-medycinski Shurnal*, Dec., 1899.

45. NADOLECZNY. Bacteriological and clinical examinations of genuine acute exudative otitis. *Arch. f. Ohrenheilk.*, vol. xlviii., p. 206.

46. FARACI. Early mobilization of the ossicular chain in the subacute period of several non-suppurative middle-ear inflammations. *Arch. ital. di Otologia*, etc., vol. ix., p. 137.

47. FARACI. Acoustic and functional importance of the mobilization of the stapes. Result of a new series of operations. *Arch. ital. di Otologia*, etc., vol. ix., p. 209.

48. WEISS. The etiology and pathology of otitis media in sucklings. *Beiträge zur pathol. Anatomie und zur allgemeinen Pathologie*, vol. xxvii.

49. SCHEMGELIDSE. Purulent otitis media in sucklings. *Dissertation*, St. Petersburg.

50. JAROWIZKI. The Bezold form of mastoiditis, caries of the petrous, mastoid, and occipital bones; abscess of the neck. *Wojenno-medycinski Shurnal*, Dec., 1899.

51. POMROY, E. H. Otitis media in all grave diseases of infancy. *Boston Medical and Surgical Journal*, Jan. 18, 1900.

52. MCCAW, JAMES W. Mastoiditis: Importance of early treatment. *New York Medical Journal*, Dec. 30, 1899.

44. JÜRGENS considers the presence of streptococci in the pus of an acute or chronic otitis to be unfavorable and to form an indication for opening the mastoid. In a series of cases pure culture of the streptococcus was associated with a remittent and continuous fever with well-marked signs of the septicemia, while in mixed infections of the streptococcus, short and long, with staphylococcus, the course was less violent with less severe symptoms and comparatively low temperature. Streptococcus brevis produces periodically violent outbreaks, alternating with quiet periods where the local and general symptoms do not present a characteristic clinical picture. Streptococci only could be found in the diseased bone. KILLIAN.

45. NADOLECZNY examined 34 cases carefully for bacteria. The pneumococcus was found pure in 7, streptococcus in 6, staphylococcus aureus in 2, albus in 3; in the others combinations of diplococci and streptococci with staphylococci were present. Early paracentesis is recommended. The disease may become chronic independent of the bacterial infection. According to the author the exudate in the tympanum acts antibacterially, and may lead to cure without perforation. BLOCH.

46. FARACI finds that there are two kinds of acute middle-ear inflammation, with mild symptoms and marked disturbance of hearing, and with severe symptoms and slight loss of hearing. Operative intervention is proper in the first variety, where the sound-conducting apparatus is affected. A flap with base down is made in the upper and posterior quadrant of the drum, exposing the incudo-stapedial joint. The exudate is removed with a small forceps which is prolonged in the niche of the oval window, and all adhesions are freed. If hearing is not improved, the flap is enlarged and the round window is cleansed. GRADENIGO.

47. FARACI reports on 20 new cases of mobilization of the stapes. The results are always good if the perceiving apparatus is in good condition. The results are best in the chronic purulent otitides, good in the residua, moderate in the dry inflammations. Vertigo disappears, but the subjective noises are rarely changed. Complications or unpleasant symptoms did not occur. GRADENIGO.

48. WEISS examined 28 cases bacteriologically and histologically. The cases were sucklings usually in the condition of pædatrophy. The temporal bones were removed very soon after death. The drum was perforated with the red-hot platinum wire,

and material for the bacteriological examination was thus obtained. The temporal bone was then fixed and decalcified. The tympanum presented a well-developed lumen with contents according to the character of the mucous-membrane affection. 1. with serous contents and but slightly swollen mucous membrane; 2. ropy, cloudy contents, the mucous membrane is changed to a kind of granulation tissue; 3. purulent exudate and evenly swollen, dark-red mucous membrane. The embryonal type of the mucous membrane is still recognizable in the second half of the suckling's age. This may explain etiologically the great frequency of middle-ear disease in suckling's age and its quite peculiar type.

Without any experience in the living, the author thinks the otitis media of sucklings has no influence on the general organism.

HARTMANN.

49. SCHEMGELIDSE investigated, 1. the frequency of purulent otitis media in sucklings; 2. the bacteriology of the middle ear; 3. the anatomical peculiarities of the tympanum and Eustachian tube of sucklings, and 4. the pathogenesis of the disease. Ninety bodies were examined, of which 46 middle ears belonging to 35 bodies were examined bacteriologically and histologically, while the remaining 55 bodies served for anatomical examination. Purulent otitis media was present in 48 (75 %) of 68 cases, and usually bilateral. In 44 (91.6 %) pneumonia was associated, and in 34 (70.8 %) gastro-intestinal catarrh. Not a single middle ear was found aseptic in the bodies of sucklings; in older children (up to the seventh year) bacteria were absent 7 times. The bacteria found were: Fränkel's diplococcus, 19 times; staphylococcus albus, 12; aureus, 5; streptococcus, 8; bacillus pyocyaneus, 3; Friedländer's diplococcus, sarcina and saccharomyces, once. Streptococci were found in the severe cases of purulent otitis; when Fränkel's diplococcus was present, mucus, epithelium, and a few pus cells were found in the tympanum.

The relative position of the pharyngeal mouth of the tube was noted in relation to the posterior end of the hard palate and the base of the skull, the breadth of the latter, the angle formed by the tubal axis and the inferior meatus, the length and breadth of the tube. These measurements were made in 80 bodies. The location of the pharyngeal ostium varied with the age; the distance from the above named structures increases. The pharyngeal ostium projects but slightly in sucklings. The line of the

tube is nearly horizontal. The length increases with the age, and the angle made with the inferior meatus becomes smaller. The tympanic epithelium is the same throughout life, but the connective-tissue fibres are nearly wanting in the subepithelial tissue. As regards air-pressure variations in the tympanum during nasal breathing, no change takes place, in mouth-breathing it varies 3-4 *mm*, in crying, 4.5 *mm*, in coughing, 6 *mm*. Inoculation of the mucus from the pharyngeal ostium of the tube and from the middle ear shows a much weaker reaction on the part of the latter, and the author believes that in the tympanum attenuation takes place.

SACHER.

50. Report of case successfully operated upon. SACHER.

51. After reviewing the statistics of Ponfick, of Breslau, POMROY reiterates the importance of repeated and careful examinations of children's ears in nearly all diseases. The origin of infection of the diseases of childhood is more easily demonstrated than in adults; the post-nasal space is the comprehensible distributing point for infection to the middle ear, the brain, the lungs, the stomach, and the intestines. The middle ear, acting as an incubator and generator, promotes toxic symptoms in localized infective diseases.

Ponfick made one hundred autopsies upon infants dying of various acute and chronic diseases, and although otitis media was not suspected in the majority of the cases it was present in all but nine of them.

The difficulties encountered in examining children's ears are many. Nothing but long practice will suffice to give a definite idea of the appearances of the tympanic membrane in health or disease, but the practice should be persisted in. Paracentesis of the membrana tympani should be preceded by thorough cleansing of the ear with sublimate solution, and ether or chloroform anæsthesia induced for a thorough examination. J. B. CLEMENS.

52. McCaw discusses the importance of and the necessity for proper treatment of mastoiditis, and draws the following conclusions: 1st. In threatened mastoid involvement, and in the mild acute cases, the conservative plan of treatment should be first tried for a week or ten days, unless dangerous symptoms arise. 2d. Operative interference should be instituted in acute cases where there is sagging of the postero-superior canal wall, when the infection is of a virulent nature, and in all cases complicating chronic otorrhœa.

J. B. CLEMENS.

b.—CHRONIC PURULENT OTITIS.

53. KOTSCHINEW. Treatment of chronic otorrhœa with sterilized and boiled water. *Wojenno-medyczny Szurnal*, January, 1900.

54. MÉNIÈRE. Treatment of chronic suppurations of the attic. *Arch. internat. de laryngolog., d'otologie*, etc., vol. xii., No. 5.

55. GARBINI and BALISTRERI. Contribution to the study of the middle ear. *Arch. ital. di Otolog.*, vol. ix., p. 181.

56. CASTEX. Operative facial paralysis. *Bulletin de laryngol., d'otologie*, etc., Dec. 30, 1899.

57. TISSOT. Large cholesteatoma of the temporal bone following a double chronic purulent otitis. *Arch. intern. de laryng., d'otologie*, vol. xii., No. 5.

58. JAKINS, PERCY. Eighty successive cases of Stacke's operation. *The Lancet*, Feb. 10, 1900.

59. BALLANCE, CHARLES A. "The conduct of the mastoid operation for the cure of chronic purulent otorrhœa, with special reference to the immediate healing of the cavity in the bone left by the operation, by means of epithelial grafts." *The Lancet*, Jan. 27, 1900.

53. Report of 200 cases. Fifty patients were treated dry ; 25 with aristol, and 25 with boric acid. Two of these died of thrombosis. Otorrhœa ceased usually after 70 days. Of the 150 treated with syringing, none died. Syringing with distilled water gave very good results in 50 cases, the otorrhœa ceased after 3 weeks, after syringing with 2-10 % boric acid (30 cases) or salt solution (25 cases) not before 60 days. Boiled water acted as well as distilled.

SACHER.

54. MÉNIÈRE has injected "ipsylène iodoformé" in the attic by means of Hartmann's canula with satisfactory results.

55. GARBINI and BALISTRERI examined the secretion of chronic purulent otitis for tuberculosis. Cultures and inoculations were made with polypoid vegetations. Four out of forty examinations proved positive. The authors draw the conclusion that tubercular caries occurs in 10 % of the cases of caries.

GRADENIGO.

56. Facial paralysis after operation may have several causes.
1. Direct traumatism from cutting instrument or bone splinter.

2. Injury by traction on the chorda tympani. 3. Commotion.
 4. Pressure on nerve by blood effusion in middle ear or produced by collection of pus in the Fallopian canal, or by ostitis of the walls. 5. Degeneration of the nerve after operation on the middle ear.

Prognosis is good. Treatment according to cause. Electricity, exposure of facial canal.

LEDRY.

57. After ten years' duration of a chronic suppurative otitis with several abscesses about the mastoid TISSOT performed the radical operation. The antrum was filled with cholesteatomatous masses. The squama was invaded with cholesteatomatous masses and appeared distended. The cavity was as large as that described by Lubet-Barbon. Above the place of election the squama was defective and granulating dura appeared.

According to the author cholesteatomatous complications are more frequent since the influenza appeared. Strange to say, no signs of brain pressure were present in this case.

SCHWENDT.

58. An interesting tabular statement with remarks and some deductions. The operation as described by JAKINS is not Stacke's operation.

ARTHUR CHEATLE.

59. This highly important paper was read at the Royal Medico-Chirurgical Society, on January 23, 1900. BALLANCE operated in two stages:

1. The operation for the removal of the disease.
2. The operation for the healing of the wound.

The first is the usual complete post-aural operation which has been for some time in vogue among aural surgeons. Special attention is drawn to the necessity for thoroughly cleaning the fossa under the Fallopian Aqueduct (Sinus Tympani of Steinbrügge).

The meatus is dealt with in a novel manner; the skin incision is made along the line of the hair and the flap turned forward with the auricle. After the bone operation is completed, a long narrow knife is passed down the meatus, the inferior wall of the canal is divided vertically well into the concha, the cut being carried with a curve upwards and backwards till it reaches the level of the anterior commencement of the helix. The posterior wall of the meatus is then pushed upwards and backwards, and attached by several silkworm-gut stitches to the skin flap, raw surface to raw surface. Before putting in these stitches, the thick layer of tissue behind the posterior wall of the meatus is cut away, in order to

facilitate the application of the meatal to the skin flap. The ragged edge of the membranous meatus is previously trimmed with scissors. The skin-incision is then sutured and the ear packed with gauze through the enlarged meatus. The second operation is undertaken, under favorable circumstances, in children at the end of the week ; in adults at the end of ten days, two weeks, or three weeks. The original incision is opened up and the flap and auricle again turned forwards. After thorough drying, the cavity is lined entirely by a large skin graft taken from the patient's arm or thigh. Care is taken that the graft covers the irregularities of the cavity accurately. As a protection to the graft pure gold leaf about $\frac{1}{1000}$ to $\frac{1}{2000}$ of an inch in thickness is accurately applied over it and the skin flap resutured. A week later the plug is removed and the gold leaf a few days later.

Mr. Ballance showed several cases in which the result was excellent. He also gave abstracts of the notes of all cases in which the grafting had been performed. This important paper should be carefully studied, as it is impossible to give in an abstract even the essential points.

ARTHUR CHEATLE.

C.—CEREBRAL COMPLICATIONS.

60. RÖPKE. Report of cases illustrating the difficulty of diagnosis in endocranial otological disease. *München. med. Wochenschr.*, No. 10, 1900.

61. WARNECKE. Two cases of sinus thrombosis with fibrous obliteration of the sigmoid sinus. *Arch. f. Ohrenhkk.*, vol. xlviii., p. 169.

62. WARNECKE. A case of fetid chronic purulent otitis with cholesteatoma complicated with a tuberculoma of the cerebellum and tubercular meningitis. *Arch. f. Ohrenhkk.*, vol. xlviii., p. 202.

63. KUNEBERG. The operation for pyæmia of otitic origin. *Wojenno medicinski Shurnal*, Nov., 1900.

64. COLLINS, BURNETT C. A case of mastoiditis ; cerebral tubercle ; death ; autopsy. *Laryngoscope*, Jan., 1900.

65. RICHARDSON, C. W. Septic thrombosis of the sigmoid sinus. *Virginia Med. Semi-Monthly*, Jan. 26, 1900.

66. HEATON, G. Infective thrombosis of lateral sinus. Cure without ligature of the internal jugular vein. *Brit. Med. Jour.*, Feb. 24, 1900.

67. CHEATLE, ARTHUR. A case of thrombosis of the lateral sinus secondary to chronic middle-ear suppuration, in which the internal jugular was not ligatured ; recovery. *The Lancet*, Jan. 13, 1900.

68. LEDERMAN, M. D. Extensive thrombosis of the lateral sinus and internal jugular vein, following acute suppurative otitis media. Ligation of the internal jugular vein in its lower portion. *N. Y. Med. Jour.*, March 17, 1900.

60. I. Chronic otitis purulenta with cholesteatoma. Pain in occiput, convulsions in extremities of same side, attacks of unconsciousness, rigidity of neck, bilateral choked disc, fever, slow pulse. Sinus was found normal at operation. Incision of cerebellum and temporal lobe evacuated only normal cerebro-spinal fluid, which appeared not to be under unusually high pressure. Hearing distance for whisper 2 metres. Recovery.

II. Chronic otitis purulenta with fistula. Pain in ear, vertigo, vomiting, attacks of unconsciousness, convulsions, facial paralysis, slow pulse, Cheyne-Stokes respiration, pain in occiput, deafness for whisper. Incision of cerebellum. Cerebro-spinal fluid not increased. No fever until after operation. Recovery.

The nature of these cases was not cleared up at operation. A case of necrosis of the labyrinth is reported, which ended fatally after curetting the labyrinth.

SCHIEBE.

61. Two cases of chronic discharge from the ear ; the second combined with cholesteatoma. The pyæmic symptoms had disappeared without producing any serious trouble.

BLOCH.

63. A soldier, twenty-five years of age, developed acute mastoiditis in the course of chronic purulent otitis. Prompt opening and cleaning out of the mastoid (the sinus was not exposed) had no effect on the course of the disease. The fever became pyæmic in type and a purulent gonitis set in. Disease of the transverse sinus was therefore suspected. The internal jugular was ligated, the sinus exposed and punctured. No thrombus was found and the sinus was not further opened. The fever remained pyæmic, purulent metastases appeared in the shoulder-joint, in the leg, and buttocks. Notwithstanding, recovery finally took place. Whether this was a case of parietal or disintegrated thrombus, or thrombosis in some other locality, or pyæmia without sinus involvement, could not be determined.

SACHER.

64. Eight weeks after a mastoid operation on a previously healthy child, the patient developed symptoms referable to intra-

cranial complication. Although the cranial cavity was carefully opened and searched, no pus was found. The autopsy showed the brain to be softened and an excess of cerebral fluid. Tubercles were found in abundance in the temporo-sphenoidal lobe, in the meshes of the pia, and in the lungs, liver, and spleen. The mesenteric glands were enlarged. Cerebral sinuses were found to be normal.

J. B. CLEMENS.

65. The patient was a man sixty years of age, who for many years had suppuration of the right ear. Symptoms of septic infection developed with vertigo and tenderness over the mastoid. The jugular region appeared normal though there was tenderness on pressure. Slight pressure over the point of exit of the mastoid vein caused severe pain. Examination of the ear showed complete destruction of the membrana tympani and of the ossicles. The usual mastoid operation was performed and the sinus exposed its entire length. The bone was eburnated. The walls of the sinus were gangrenous and, when opened, it was filled with a broken-down clot. As no return flow could be established from below, the jugular was exposed, ligated, and removed. The patient died twenty-six hours after the operation as a result of the intense sepsis. No autopsy.

J. B. CLEMENS.

66. After performing the usual steps of the radical post-aural operation, a dark spot in the posterior antral wall led to the lateral sinus, which was occupied by a dark red, firm, healthy-looking clot, except at the point of infection, where it was yellow and breaking down. As the operation was performed within twenty-four hours of the first sign, and the clot appeared healthy on each side of the point of infection, the sinus was laid freely open and all clot cleared out from above and below without ligaturing the internal jugular. As giddiness, due in all probability to disturbance of the intracranial circulation, was a marked symptom, the cerebellum on each side of the sinus was explored with a negative result. Double optic neuritis was present, and existed for at least three months after recovery had occurred.

ARTHUR CHEATLE.

67. A man aged thirty-five years suffered with discharge from the left ear for many years. On opening the sinus, it was found filled completely with a soft adherent clot. On passing a small Volkmann's spoon down towards the jugular fossa, a drachm of most offensive pus was evacuated. The sinus having been thoroughly cleaned was lightly packed with gauze. The pus

yielded, on cultivation, growths of staphylococcus pyogenes albus and citreus, a non-capsulated diplococcus, and many putrefactive bacteria. The patient was shown at a meeting of the Birmingham and Midland Counties Branch of the British Medical Association held on Feb. 8, 1900. ARTHUR CHEATLE.

68. The case reported is that of a girl nineteen years of age who had pain in both ears and over both mastoids. The left drum-membrane, which was red and bulging, was incised, and under hot irrigations and the use of the ice coil the severity of the inflammation subsided. The right ear was discharging freely. The ice coil simply relieved the pain in the right mastoid but did not check the extension of the inflammation. After a well-defined chill, followed by a temperature of 104.8° F. and the development of tenderness along the sterno-mastoid muscle, the mastoid was opened. The sinus was superficial and located very far forward; it was exposed, aspirated, and found to contain pus. The internal jugular was then ligated about an inch above the clavicle and opened, being thereupon followed by an outflow of pus. The vein was not excised. Periphlebitis subsequently followed. Patient recovered. The case illustrates the rapidity with which extensive complications can follow acute middle-ear inflammation, the anomalous position of the sinus, and the occurrence of periphlebitis. J. B. CLEMENS.

NERVOUS APPARATUS.

69. BAGINSKY. The pathogenesis of acute deafness. *Arch. f. Kinderheilk.*, Nos. 1 and 2, 1900.

70. COURTADE. Hysterical deafmutism in a girl of three and a half years. *Arch. internat. de laryng., d'otologie, etc.*, vol. xii., No. 6, 1899.

71. OPPENHEIM, S. The so-called Ménière's disease. (Vertigo ab aure læsa, vertigo auralis.) *Wien. klin. Rundschau*, Nos. 40 and 42, 1899.

72. CASTEX. On deafness of central origin. *Bulletin de laryng., d'otologie, etc.*, March 30, 1900.

73. WEBER, H. PARKES, and LAKE, R. Acute Ménière's symptoms in spleno-medullary leucocythæmia, with special reference to the anatomical changes found in acute leucocythæmic affections of the ear. *Proceedings of the Royal Medical and Chirurgical Society*, Feb. 27, 1900.

74. HOOPLE, H. N. History and discussion of a case with Ménière's syndrome. *Laryngoscope*, Dec., 1899.

69. Connective-tissue and bone formations were found in the cochlea of a girl, thirteen years old, who had been ill with meningeal symptoms and become deaf; she had died three months later from a carbuncle of the upper lip. The temporal bones were examined in serial sections and in addition to a condensing otitis, degeneration of the eighth nerve was found and the tympanum showed no marked changes. Examination of the brain and meninges was negative. Thus an acute labyrinthitis may cause symptoms like meningitis in children. BRÜHL.

70. An intelligent girl, three and a half years old, became deaf and dumb after a slight injury to the hand and fright. No medication has succeeded in relieving the condition. The drum-membranes were practically normal. SCHWENDT.

72. CASTEX believes that central deafness is not sufficiently kept in mind in the cases of deafness of obscure origin. The anatomical connection of the ear and brain is described. Deafness is divided in two groups: central deafness without lesions, and central deafness with lesions demonstrable anatomically. In the latter group belong word-deafness and deafness after meningitis, meningeal and cerebral hemorrhage. A new case of word-deafness, observed in 1897 by Déjérine and Sérieux, is described. At autopsy a chronic cortical periencephalitis extending to both hearing centres. Deafness after meningitis is not rare. Grad-enigo was able to get a history of preceding meningitis in 154 out of 2247 cases of nervous deafness. Colley of Lyons observed a similar case of left-sided deafness, combined with hemianæsthesia and hemianopsia. The autopsy revealed an area of softening in the internal capsule and lenticular nucleus.

Deafness without lesions includes, 1. Psychic deafness, frequently met with in neurotics and children. The patient sometimes does not perceive the spoken word, but the sound of a musical instrument. 2. Deafness of inhibitory nature, after fright or emotion. 3. Deafness as epileptic aura; Féré has recently reported a case of this kind.

The diagnosis, deafness of central origin, is to be made when other functions are simultaneously affected, though confounding with hysterical symptoms must be guarded against.

73. A man aged thirty-one years died of spleno-medullary leucocythæmia. About six months before death he was attacked

with headache, vertigo, and vomiting, and became deaf in a very short time. Post-mortem examination of the ears showed that a portion of the scala tympani (one side only examined) and the perilymphatic spaces of the semicircular canals (both sides examined) were filled with newly formed fibroid and bony tissue. The scala vestibuli, canalis cochleæ, and vestibule showed only comparatively slight changes. Transverse sections of the nerve trunks showed no obvious change. The deduced sequence of events is that more or less extravasations of blood in the semicircular canals and cochlea first occur, followed by vascularization and organization of the clot, and, if the patient lives long enough, more or less ossification in the newly formed tissue and the projection of irregular processes of bone from the walls of the bony labyrinth.

WEBER draws attention to the light thrown by leucocythæmic cases of Ménière's symptom-complex on cases associated with constitutional disorders, such as arterio-sclerosis, syphilis, chronic gout, renal fibrosis, and the various cachectic conditions in which hemorrhages often occur.

ARTHUR CHEATLE.

74. The patient, a man of decidedly nervous temperament, aged twenty-six, was awakened from sleep by a feeling so strange that he arose, and in doing so, fell heavily to the floor. Two weeks later a similar attack occurred, followed by vomiting and purging. Lighter attacks after this at various times were preceded by vertigo. No loss of consciousness or evidence of epilepsy was present. The vertigo was occasionally apoplectiform. Tinnitus aurium, although absent at first, became annoying and louder after each succeeding attack. The examination of the ear showed no pathological condition to aid in explaining the seizures. HOOPLE thinks the vertigo is due to increased intralabyrinthine pressure, and compares the condition to that caused by glaucoma on the rods and cones of the retina. The theory of a reflex-neurosis is advanced to explain the vertigo, and a number of reasons are given to support it. J. B. CLEMENS.

NOSE AND NASO-PHARYNX.

a.—GENERAL PATHOLOGY.

75. VIOLETT. Means of defence of the organism against respiratory infection in the nasal fossæ. *Arch. internat. de laryng., d'otologie*, vol. xiii., No. 1.

75. VIOLETT has examined under the guidance of Chatellier

the antibacterial action of the nasal mucus. Leucocytes in the nasal mucus possess amoeboid action and can swallow pneumococci and diphtheria bacilli and thus render them inert. These leucocytes are only in the mucus of the upper and posterior part of the nasal cavities; this region is also aseptic but the vestibulum is very septic.

Nasal mucus therefore serves partly as a filter for the inflammatory agents. The mucous membrane becomes hypertrophied from the continued irritative action of these agents, though it cannot withstand prolonged irritation and resist invasion of the general organism. Some patients succumb to a slight operative intervention. It is needless to add that in nasal surgery strictest antiseptic precautions must be employed. SCHWENDT.

b.—METHODS OF EXAMINATION AND TREATMENT.

76. KAY. A new nasal speculum for children. *Wratsch*, No. 6, 1900.

77. SALESSOWA. Vibratory massage in the treatment of the diseases of the nose, throat, and ear. *Bolnitschuaja Gaseta Botkina*, No. 37-40, 1899.

78. STERN. Pathology and therapy of chronic rhinitis; treatment with massage. *Eschenedelink*, No. 13, 1900.

79. GRIFFIN, THOMAS. The treatment for hypertrophy of the inferior turbinated bone. *N. Y. Med. Fourn.*, Feb. 24, 1900.

80. CHAPPELL, WALTER T. Remarks on intranasal operations. *N. Y. Med. Fourn.*, Jan. 17, 1900.

77. Solutions of cocaine 10%, iodine $\frac{1}{4}$ %, menthol in vaseline 2%, and parachlorphenol in glycerine 2% were used in the massage treatment. Ozæna and chronic atrophic rhinitis are most benefited of nasal disease by vibratory massage. In the former, massage must be applied daily; the odor disappears, the dry, gray mucous membrane becomes more moist and pink in color, the crusts become softer and are more easily removed. In chronic hypertrophic rhinitis, vibratory massage produces a distinct improvement after five to ten sittings: the mucous membrane becomes paler, the meatuses more free, the hypertrophy and secretion less. If treatment is short, relapses are likely to occur. Vibratory massage influences favorably the neuralgias, eye diseases, hay-fever, and bronchial asthma depending on a nasal affection. Chronic atrophic and hypertrophic pharyngitis are

likewise benefited. In ear disease the ostium and walls of the tube were massaged. It is also well to apply massage externally on the neck.

SACHER.

78. STERN describes three cases where massage of the nasal mucous membrane after Hagedorn (*Aertzliche Praxis*, 1899, No. 7) with a hard-rubber catheter and occasional vibratory massage produced rapid diminution of the hypertrophy and secretion.

SACHER.

79. GRIFFIN advises the removal of hypertrophy of the soft parts of the lower turbinate as well as that of the bone when the body lies close to the septum. The restoration of the inferior meatus is essential to the prevention of relapses, even of recurrence of polypi. The operation is performed by means of the saw after thorough cocainization and application of suprarenal capsule. For subsequent plugging he uses absorbent cotton only, which is left for twenty-four hours or longer.

M. TOEPLITZ.

80. CHAPPELL pleads for conservatism in intranasal operations, particularly those upon the septum. After thorough removal of spurs under cocaine and suprarenal extract the wound is powdered. A splint of guttapercha, shaped before operation, is held firmly over the cut surface by a retainer, and the dressings, in preference those made from Bernays sponge, are introduced external to the splint and left in most cases until the third day. For septal deviations Chappell uses splints consisting of two hollow plates which are connected by a spring and carry a plate at the posterior end after the shape of a fan, to be elevated after introduction. The Simpson splint made from Bernays sponge is used for pressure.

M. TOEPLITZ.

C.—OZÆNA.

81. SIEBENMANN. On ozæna (rhinitis atrophica simplex et fœtida). *Correspondenz-Blatt f. Schweiz. Aerzte*, xxx., March 1.

82. NÖBEL and LÖHNBERG. Etiology and operative radical cure of genuine ozæna. *Berl. klin. Wochenschr.*, Nos. 11, 12, 1900.

81. Ozæna is treated by SIEBENMANN chiefly from a pathological standpoint. The two chief peculiarities are the metaplasia of the epithelium and the atrophy of the turbinate. There are, however, cases of metaplasia of the epithelium without atrophy of the turbinates. This metaplasia is the most constant pathological change of this disease, and it might be better to call the atrophic fœtid rhinitis simply metaplasia.

The most important conclusion arrived at is : metaplasia of the epithelium occurs in broad and narrow noses, in broad and narrow faces, but that form of disease of the nasal epithelium combined with the formation of foetid crusts occurs, as a rule, in the broad nose of the broad-faced persons.

In the discussion following this paper Prof. Müller mentioned that he had observed metaplasia of epithelium of the bronchial mucous membrane.

SCHWENDT.

82. In this paper NÖBEL and LÖHNBERG support Grünwald's focal lesion of ozæna. The material includes 111 cases of nasal suppuration, leaving out the suppurations produced by subacute rhinitis, vegetations, syphilis, abscess of septum, foreign body, etc. The number presenting the triad, foetor, atrophy, crusts, is not stated, nor the number treated by operation. The authors regard the ozæna question as solved, as all attempts at explanation by the turbinate theory have failed and the focal theory has explained all sides of the question and has shown us :

1. That most nasal suppurations appearing like ozæna depend upon disease of the sphenoidal cavity and ethmoidal region.

2. Nasal suppurations with foetor, atrophy, and crust-formation may depend on various causes ; the majority depend on localized suppurations in the sphenoidal and ethmoidal regions.

3. A rational treatment of ozæna can only be expected when the primary cause is discovered.

4. As the causes are usually sphenoidal or ethmoidal empyema, treatment of ozæna must be surgical to be effectual.

The operative treatment of the sphenoidal cavity is given with a description of some new instruments. The number of case histories is unfortunately very small ; only three are reported.

MÜLLER.

d.—NEW GROWTHS.

83. HEYMANN. The benign tumors of the nose. Reprint from the *Handbuch der Laryngologie und Rhinologie*, Vienna, 1899.

84. CHOLEWA. Why do nasal polypi recur? *Monatschr. f. Ohrenhkl.*, No. 3, 1900.

83. HEYMANN gives a very detailed description of the benign tumors of the nose with many macroscopic and microscopic pictures.

HARTMANN.

84. Polypi result of a subacute osteomyelitis which gives rise to recurrences.

KILLIAN.

c.—ACCESSORY CAVITIES.

85. GERBER. A double diaphanoscope for transillumination of the frontal sinuses. *Deutsche med. Wochenschr.*, No. 11, 1900.

86. MARTIN. The frequency of empyema of the nasal accessory sinuses. Paris, A. Masson, 1900.

87. LICHTWITZ. Disproportion between the frequency of the empyema of the accessory sinuses in the living and dead. *Ann. des mal. de l'or.*, etc., No. 11, 1900.

88. FURET. A new case of frontal empyema discharging into the maxillary sinus. *Arch. internat. de laryng.*, *d'otol.*, etc., No. 11, 1900.

89. DE ROALDÈS, A. W. Chronic empyema of the antrum of Highmore operated by the Caldwell-Luc method. *N. Y. Med. Jour.*, Jan. 6, 1900.

90. BRYAN, J. H. Chronic abscess of the frontal, ethmoidal, and sphenoidal sinuses, followed by meningitis and death. *N. Y. Med. Jour.*, Jan. 20, 1900.

91. TILLEY, HERBERT. Two cases of chronic frontal sinus empyema in which the radical external operation had been performed. *Lancet*, Feb. 10, 1900.

85. GERBER has had two transillumination lamps attached to a rod so that both frontal sinuses can be illuminated at the same time. This facilitates the comparison between the two sides. The apparatus can also be used for one-sided illumination, and is made by Reiniger, Gebbert, and Schall. NOLTENIUS.

86. MARTIN has collected all investigations on frequency of empyema on the cadaver and living. The empyema was observed fifteen times more frequently in the dead than the living. The cause for this is the great rarity of occasion for diagnosing empyema. The acute form is hidden by the acute coryza, and in the severe forms masked by the other symptoms. In the chronic form the symptoms are sometimes so slight as not to inconvenience the patient. The difficulty of diagnosis must also be considered.

HARTMANN.

87. A paper of more or less the same contents as the preceding. HARTMANN.

88. Transillumination of the maxillary sinus is often negative though pus appears in middle meatus. In a case of this kind FURET opened the antrum according to Luc, but found it normal.

The frontal sinus was opened and found filled with granulations.

• Recovery took place with a deforming scar. SCHWENDT.

89. DE ROALDÈS reports five cases operated by him according to Caldwell-Luc, as follows : After incision through the soft parts under the everted lip, inclusive of the periosteum, beginning below the gingivo-labial fold near the frenum and extending in a horizontal direction to the root of the first molar, both flaps were detached from the bone, the anterior wall laid bare and opened with chisel and bone forceps. The anterior third of the corresponding inferior turbinated body was then removed with cutting forceps and the nose plugged. From the antrum the nasal wall of this denuded portion was perforated and enlarged with a gouge. The outer opening was closed with catgut sutures and a plug inserted from the nose. M. TOEPLITZ.

90. A female, æt. forty, had left side of nose blocked with polypi, containing also a considerable amount of pus anteriorly and a scant one post-nasally. Through an operation from without, the left frontal sinus and anterior ethmoidal cells were thoroughly cleansed. However, upon investigation, pus continued to ooze. Outer wound was closed after packing the cavity. Death ensued four days later. The autopsy revealed the left side of the cribriform plate to have been destroyed, the left olfactory ganglion softened, the dura mater adherent to the calvaria, a firm clot in the superior longitudinal sinus, and both Gasserian ganglia softened. There was pus in the left posterior ethmoidal and in both sphenoidal sinuses, which had not been recognized during life. An acute lepto-meningitis was also found. M. TOEPLITZ.

91. In both cases the disease was bilateral and the antra also affected. TILLEY'S usual line of treatment is to remove the nasal polypi or chronic inflammatory products from the region of the middle meatus, and also in all cases the anterior half of the middle turbinate bone before opening the sinus by the brow incision ; the antra, if affected, being drained by the alveolar route. A drainage tube is inserted in cases where the sinus had not been obliterated. The results in the cases shown at a meeting of the Harveian Society of London, February 1st, were very satisfactory.

ARTHUR CHEATLE.

f.—OTHER AFFECTIONS OF THE NOSE.

92. KAYSER. Adhesions in the nose (synechia and atresia).
Reprint from *Handbuch der Laryngologie und Rhinologie*.

93. FLATAU. The radical operation of bony occlusion of the choanæ. *Wien. klin. Rundschau*, No. 40, 1899.

94. WOAKES, CLAUD. Bullet wound in the head ; removal of the bullet from the nose months afterward. *Lancet*, Jan. 6, 1900.

95. EDDOWES, A. Coccogenous sycosis, which had commenced on the upper lip, apparently from infection due to discharge from the nose. *Lancet*, Feb., 1900. Harveian Society, Feb. 1, 1900.

95a. COBB, FRED C. Epistaxis. *Boston Med. and Surg. Journ.*, Jan. 4, 1900.

92. There are anterior, middle, and posterior synechiæ. The last are very fully described. Of congenital atresia of the choanæ three groups are formed, according to position and genesis : 1, intranasal atresia of the choana; 2, marginal atresia of the choana; 3, extranasal or retranasal atresia of the choana, which are situated just back of the choanæ.

HARTMANN.

93. A patient, forty years old, had the right nasal cavity filled with greenish-yellow masses of mucus, and the lower turbinate appeared hypertrophied and touched the septum.

By posterior rhinoscopy a complete closure of the oval aperture was revealed by a pale-red homogeneous plate of bony consistency. The lower turbinate was resected and two weeks later the central part of the plate was cut away ; the finger introduced in the pharynx protected the parts there from injury. Recovery, with relief of symptoms.

POLLAK.

94. A soldier was shot from above, the bullet entering the skull just below the left frontal eminence and destroying the eye. Twenty months later a broad membranous bridge almost closed the left nostril. After cutting through the membrane, an irregular piece of lead measuring 1 inch in length, $\frac{1}{4}$ of an inch in breadth, and weighing 343 grains, was removed, together with a square inch of khaki, which had been carried in from the peak of the helmet. The inner wall of the antrum and the anterior two-thirds of the inferior turbinated bone were absent. A small stellate scar was present in the roof of the mouth.

ARTHUR CHEATLE.

95. The patient had had sore eyes for many years, and EDDOWES thinks that they had infected the nose and thence the lip. Treatment of the eyes with yellow oxide of mercury was advised.

ARTHUR CHEATLE.

95a. The causes of epistaxis are local or general. The commonest local cause is the deformity of the septum anteriorly, with

the forcible removal of crusts with the finger or handkerchief, or sometimes posteriorly. Ulcerations may also occur without scratching. Other local causes are fracture, angioma, and operations. Among the general causes are plethora, anæmia, hemorrhagic diathesis, acute febrile diseases, vicarious menstruation, syphilis, phthisis, alcohol, and nephritis, the latter being illustrated by two cases. For treatment, cocaine, suprarenal extract (10%), cauterization with chromic acid and galvanocautery, and packing with long strips of gauze are recommended.

M. TOEPLITZ.

g.—NASO-PHARYNX.

96. LICHTWITZ and SABRAZES. State of the blood in those with adenoids. *Arch. intern. de laryng., d'otol., etc.*, vol. xii., No. 6.

97. DANZIGER. Adenoid vegetations. *Monatschr. f. Ohrenheilk.*, No. 1, 1900.

98. TETEREWJATNIKOW. On the frequency of adenoids, their connection with ear disease and aprosexia. *Medicinskoje Oboswenje*, February, 1900.

99. ARSLAN. On 1800 cases of adenoid vegetations. *Archiv italiano di Otologia*, etc., vol. ix., 159.

100. GARBINI. Hypertrophy of the pharyngeal tonsil in the province of Messina and Reggio. *Arch. ital. di Otol.*, vol. ix., p. 204.

101. HELLAT. Carcinoma of the naso-pharynx. *Eshenedelnik*, No. 14, 1900.

96. These authors found the blood of children suffering with adenoids to contain fewer blood corpuscles and hæmoglobin than normally. After the removal of the adenoids the condition of the blood improved to the normal.

SCHWENDT.

97. DANZIGER endeavors to arrange children with adenoids in groups. The basis of this division is, however, very uncertain.

KILLIAN.

98. In the last three years 7270 throat, nose, and ear patients visited the clinic Basanow, in Moscow. Of this number 8% were afflicted with adenoids. One third of these suffered also from ear disease. In three cases adenoids were found in patients between forty and fifty years. Of 200 students with ear trouble, 20% suffered from adenoids.

SACHER.

99. This is an exact statistical report of the conditions associated with adenoid vegetations. GRADENIGO.

100. In the moist climate of southern Italy, with inconstant temperature, GARBINI found 5% of his patients to have adenoids, 20% in the patients under twenty years.

GRADENIGO.

101. Carcinoma of the naso-pharynx is very rare, and only three cases have been described. HELLAT describes the following case: A woman forty-three years old had been ill with severe coryza and deafness for several months. A compact nodular and easily bleeding tumor occupied the posterior and lateral walls of the naso-pharynx. Microscopically the tumor proved to be a carcinoma. The growth was removed with a sharp spoon, and adenotome, but recurred in Rosenmüller's fossa after several weeks. Extension into the skull caused hemiparalysis of the face, headache, paralysis of the vocal cords, increase in pulse rate to 126, dysphagia, dyspnoea, fever, anæsthesia and hypersecretion of the pharynx, paralysis of the ocular muscles, and finally death from paralysis of the heart. Every attempt at speaking caused marked dyspnoea; this, Herzfeld thinks, is due to a paralysis of the recurrent nerves. The difficulty in swallowing and in expectoration was caused by paralysis of the superior laryngeal nerves. Prof. Ratimow had observed a similar cause originating in the posterior wall. One month later, blindness of central origin set in. The glands were enlarged. Paralysis of the cranial nerves and death followed.

SACHER.

SOFT PALATE, PHARYNX, AND BUCCAL CAVITY.

102. AVELLIS. Pemphigus of the mucous membrane as a cause for adhesion of the soft palate, and cure by particular hard-rubber bougies. *Münch. med. Wochenschr.*, No. 10, 1900.

103. KUJASHEZKI. On the tonsils of children. Dissertation, St. Petersburg, 1899.

104. ROEGER. Angina with endocarditis. *Münch. med. Wochenschr.*, No. 8, 1900.

105. AUE. The tonsils, as entrance for infection in the organism. *Bolnitschuaja Gaseta Botkina*, Nos. 2 and 3, 1900.

106. RATIMOW. Lymphangioma of the soft palate. *Eshenednik*, No. 14, 1900.

107. KELLER. Syphilis of the lingual tonsil. *Berl. klin. Wochenschr.*, No. 9, 1900.

108. POLJAKOW. A case of healed noma. *Medicinskoje Obosvenje*, August, 1899.

109. KIESOW. Contribution to the psycho-physiology of the buccal cavity. *Arch. ital. di Otologia*, vol. ix., p. 129.

110. HOPE, G. B. Primary hemorrhage following amygdalotomy. *N. Y. Med. Jour.*, March 3, 1900.

111. HOWE, ALEXANDER C. Gangrene of the tonsils. *Phil. Med. Jour.*, March 17, 1900.

112. PACKARD, FREDERICK C. Endocarditis occurring in the course of tonsillitis. *Amer. Jour. Med. Sci.*, Jan., 1900.

113. GAMBLE, CARY B. and TIFFANY, L. M. Foreign body imbedded in the naso-pharynx and posterior pharyngeal wall. *Phil. Med. Jour.*, Jan. 6, 1900.

102. AVELLIS'S is the fourth case of pemphigus causing this deformity. Hegar's hard-rubber bougies were used, similar to those used for the cervix.

SCHIEBE.

103. Numerous measurements on bodies of children showed that the tonsils increase in weight three and a half times to end of first year, three and a half times between first and fifth years, and, again three and a half times between fifth and twentieth years. The pharyngeal tonsil becomes 4 mm longer and 3 mm broader and thicker in the first year, and 5 mm longer, 3 mm broader, and 2 mm thicker between the fifth and twentieth years. The tonsils develop by diminution of the connective tissue and the increase of the lymphoid elements. Their function, the emigration of lymphocytes through the epithelial covering, can be observed in the new-born, but is less in sucklings.

SACHER.

104. In 120 cases of angina, a cardiac murmur was noted in 20 per cent.

SCHIEBE.

105. AUE relates a case of a girl, eleven years old, where endocarditis, articular rheumatism, and erythema nodosum followed a simple angina. *Staphylococcus pyogenes aureus* was obtained from both tonsils.

SACHER.

106. Two cases of lymphangioma of the soft palate have thus far been reported. The following is the third: A patient, forty-one years old, had had a small tumor removed from the soft palate fourteen years ago on account of difficulty in breathing and swallowing. The tumor recurred four years ago in the right half of the soft palate. Above the angle of the right jaw there is a round swelling as large as a hen's egg. The right half of the

soft palate is occupied by a round nodular tumor, as large as an orange, filling the naso-pharynx and a part of the pharynx; it was circumscribed and fluctuated in places. The slow growth and defined margin favor benignity. The tumor was easily removed after resection of the lower jaw. All symptoms were relieved. The microscopical specimen showed the development of lymph spaces and cysts from the fat situated between the muscles of the soft palate.

SACHER.

107. KELLER proves that secondary syphilis does not infrequently, in 10–12 per cent., produce typical and severe processes in the lingual tonsil. The relation of the smooth atrophy of the lingual tonsil to syphilis is thus made clear. Among 6500 reports of autopsies, of 103 cases of atrophy of the root of the tongue, 71 showed anatomical signs of syphilis. In his own researches 17.5 per cent. of marked atrophy in 40 cases of tertiary syphilis have led the author to regard the smooth atrophy of the root of the tongue as a symptom of value when in conjunction with others.

MÜLLER.

108. The healing took place by the application of 1 per cent. solution of pyoctaninum cœruleum. This solution was applied several times daily. The gangrenous parts were cast off after a few days and the base of the ulcer cleansed itself.

SACHER.

109. KIESOW demonstrated that a part of mucous membrane of the cheek was totally insensitive to pain. This region lies in the line drawn from the angle of the mouth back to the second molar.

GRADENIGO.

110. HOPE ablated both tonsils under chloroform in a woman æt. twenty-six. The bleeding following the operation continued for three hours and was controlled by the galvano-cautery, ergot, the maintenance of the erect position, and principally by the final syncope.

M. TOEPLITZ.

111. A male, æt. twenty-six, emitted a strong odor from the mouth owing to a brownish, foul-smelling discharge. The lower part of face and left submaxillary region were considerably swollen. The gums, inner surface of the lips, and under surface of the tongue were greatly swollen and covered with deep excoriations or ulcers. On the left side there was a large tumor, involving the entire tonsillar region, extending beyond the median line to a point near the opposite tonsil and well up into the naso-pharynx, with a circular necrosed spot half an inch in diameter,

of greenish color, perforated in its centre and in the same manner on the inner surface. In spite of several removals of the gangrenous masses, the destruction extended farther until nitric acid was applied. Three months after recovery severe epistaxis set in which could not be controlled except by constant plugging. In a few days the nose issued a foul-smelling discharge, multiple abscesses appeared, and the patient died from septic pyæmia.

M. TOEPLITZ.

112. PACKARD reports in full five cases in which an acute tonsillitis of more or less severe character was followed by a central valvulitis, arising as a direct consequence either from infection by micro-organisms or structural change in the valves due to toxins. The paper concludes by many literary references.

M. TOEPLITZ.

113. A woodcarver, æt. thirty-nine, was working at a machine consisting of a frame in which two chisels ($4\frac{1}{2}'' \times 1'' \times 1\frac{3}{8}''$, and $3\frac{1}{2}''$ ounces in weight) were fastened. The frame was revolving 3200 times a minute, when it broke, setting the chisels free, which struck the workingman, whose throat, across larynx and trachea, was cut, and also the face from the inner side of the right ear upwards to the bridge of the nose, which was fractured. His head was then bent slightly forward and to the right, and the vision in the right eye was gone. He had difficulty in swallowing, food regurgitation through the nose, and a muffled voice. A hard mass was felt with the probe through the right lower nasal meatus and with the finger behind the soft palate, extending far upward, straight up and down, with its width antero-posterior, and firmly fixed. A skiagraph defined the upper end about an inch above the nasal floor, resting against the right palate bone, with its lower end against the fifth cervical vertebra. The chisel was removed through a facial incision after preliminary tracheotomy.

M. TOEPLITZ.

BOOK NOTICES.

VIII. A Manual of Otology. By GORHAM BACON, A.B., M.D., Professor of Otology, Cornell University Medical College, New York ; Aural Surgeon New York Eye and Ear Infirmary. With an introductory chapter by Cl. J. Blake, Professor of Otology, Harvard University. Second edition, revised and enlarged. With 114 illustrations and 3 plates. Small 8vo, 422 pages. Lea Bros. & Co., New York and Philadelphia, 1900. Price \$2.25.

This second edition of Dr. Bacon's text-book, not quite two years after the appearance of the first, is sufficient evidence of its value and appreciation. It has been increased by about twenty-five pages, a number of new figures, and replacement of old ones by new. Among the latter is Plate II., colored, with six figures representing different otoscopic pictures of the drum membrane. They give an idea of conditions they are meant to represent, but suffer from the imperfection inherent in almost all pictures of the drumhead. There are things we can learn only by studying them from nature. Clinical observation can be assisted, but not replaced by drawings. As a college text-book Bacon's manual is excellent.

H. K.

IX. Eye, Ear, Nose, and Throat. A manual for students and practitioners. By W. L. BALLENGER, M.D., and A. G. WIPPERN, M.D., of Chicago, Ill. Lea Bros. & Co., Philadelphia, Pa. Price, cloth, \$2.00 ; flexible leather, \$2.50.

This is a very well gotten-up text-book of 511 pages, small 8vo, with 150 engravings and 6 colored plates ; heavy glazed paper ; one of "Lea's Series of Pocket Text-Books." The Eye, occupying 170 pages, is by Wippern ; the Ear (97 pp.), the Nose (80 pp.), the Pharynx (69 pp.), and the Larynx (66 pp.) by Ballenger.

Type and illustrations are clean, the latter almost all borrowed from other books, and the bulk of the text likewise. The authors

do not conceal this and declare they "have made free reference to nearly all of the recent text-books of English and American authorship, as well as to a number of French and German works." Nevertheless they have done a good work, furnishing to the rapidly increasing army of American young physicians that want to make the above specialties their life-work a concise, clear, and handy guide-book admirably adapted to their needs and desires. Several chapters give evidence that the authors have been more than diligent and capable compilers, as is evidenced by some chapters bearing the stamp of personal experience and judgment; for instance, the paragraphs on the Pharynx, where we even find several illustrations without the names of the original authors, and some instruments without the imprint of the firms making them. The condensation of the subject-matter is very practical, and the presentation neither meagre memory-drudgery, nor tedious school-master talk on more or less generally known topics. The easy style shows that the authors have been instructors of those to whom the compendium chiefly seems to appeal — the students of post-graduate and polyclinical institutions. H. K.

SOCIETY MEETING.

The Third Pan-American Medical Congress will be held in Havana, Cuba, December 26th to 29th, inclusive, 1900. There will be a Section of Otology of which Dr. Jas. F. McKernon, 62 West 52d Street, New York, is the Secretary for the United States, and a Section of Ophthalmology, of which Dr. J. E. Weeks, 46 East 57th Street, New York, is the Secretary for the United States. The rate of the round trip to Havana will be about one fare. Particulars concerning transportation may be had by addressing Dr. H. L. E. Johnson, 1042 L Street, N. W., Washington, D. C.

Obituary.

Professor KUHN, of Strassburg, is dead.

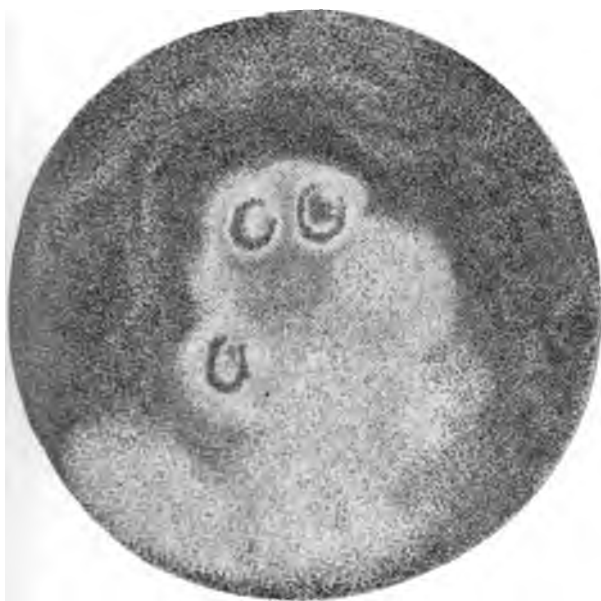


Fig. 1.



Fig. 2.



Fig. 3.

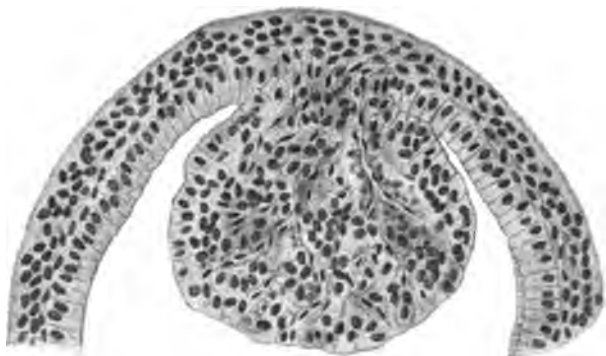


Fig. 4.

EDITORIAL NOTICE.

The ARCHIVES OF OTOLOGY is a bi-monthly journal, published in annual volumes of about five hundred pages each, extensively illustrated with cuts in the text, half-tone text plates, and lithographic plates, many in colors.

About three quarters of the space is devoted to original papers, and the remaining quarter to a systematic report on the progress of otology, and to reports of societies, book reviews, and miscellaneous notes.

The papers and reports are original, and only accepted with the understanding that they are to be published in this journal exclusively. The original papers in the English edition appear in the German (*Archiv für Ohrenheilkunde*) either in full or in more or less abridged translations, and *vice versa*.

Any subscriber that wishes to refer to the original text of a translated or abridged paper may, by applying to the editor, obtain a reprint which, it is expected, he will return after perusal.

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ARCHIVES OF OTOLOGY.

SHALL THE ANTRUM BE OPENED IN ALL ACUTE EMPYEMAS OF MASTOID CELLS?

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THERE is some difference of opinion among otologists as to what method of operative procedure should be followed in acute empyema of the mastoid cells.

Broadly stated, operators in such conditions may be divided into two classes: (1) those who open the antrum mastoideum in all acute empyemas of the mastoid cells; and (2) those who open the mastoid cells without opening the antrum mastoideum; and to these two classes perhaps a third may be added, viz., those operators who occupy a position intermediate between the other two.

Perhaps the position of the second class of operators, who open the mastoid cells without going into the antrum, can best be stated by literally quoting Politzer, who stands as the exponent of this class.

Politzer (1) says: "If the middle portion of the mastoid plane ($\frac{3}{4}$ to 1 cm behind the osseous meatus and about 1 cm above the lowest point of the mastoid process) is laid free, a piece of cortex 1 cm wide and about $1\frac{1}{2}$ cm vertically is chiselled out with a large gouge set at an angle. Frequently the abscess is reached after the first blow with the chisel, from which the pus rapidly flows, a fact which shows that it is under high pressure in the cavity. In other cases one or more small abscesses are found at a depth of $\frac{1}{2}$ cm, and rarely at a greater depth. When the abscess is in the lower portion of the mastoid process the operation opening must be lengthened below.

"When the abscess cavity is opened, the opening in the bone is enlarged partly with the chisel, partly with Luer's forceps in the direction in which the cavity extends, and the fungoid granulations and softened bone tissue scraped away with a sharp spoon. With some experience one can easily differentiate the diseased tissue from the normal: the first gives way easily for the sharp spoon, while the normal tissue offers a certain resistance. In long-existing extensive abscess formations it is occasionally necessary to take away the greater portion of the mastoid process to the lowest point and to the sinus lateralis, the latter of which is sometimes found lying free.

"Almost without exception there was no communication between the abscess and the mastoid antrum in the large number of cases operated on by me. The establishment of an opening between the two is not wished in any case of acute middle-ear inflammation, as the wound cavity which is disinfected after scraping would become reinfected by the pus from the antrum.

"The favorable effect of opening a mastoid abscess is manifested in most cases shortly after the operation by a rapid fall of the fever, through the disappearance of local pain, and the general well feeling of the patient.

"The average duration of the wound treatment until complete cicatrization varies in the regular course from two to five weeks. Irregular course of the wound is observed in infectious middle-ear affections, occasionally with influenza, in cachectic individuals, and when the abscess cavity has not been sufficiently scraped out. Unfavorable symptoms during the treatment of the wound are frequent rise of temperature, suppuration in the wound cavity, abscess formation in its vicinity, erysipelas, headache, and vomiting, which signify a consecutive intracranial affection. A close examination of the wound cavity and the further removal of all remaining particles of carious or necrotic bone and fungoid growths are sufficient in many cases to produce a normal course of healing. Fatal results from meningitis, sinus phlebitis, and pyæmia are rare and are usually seen in tuberculous and cachectic individuals."

As the exponent of Class 1, or those who open the antrum in all cases of acute empyema of the mastoid cells, Schwartze (2) may be selected, and he employs the following well-known method: "After the incision is made and the periosteum laid back the bone is carefully inspected; if a fistula is disclosed or discoloration of the cortex, the bone is here opened with gouge or chisel and the granulations and diseased bone removed. If the cortex is healthy, that spot of bone is selected for opening into the antrum where one can enter the antrum by the shortest route and where nature herself in her spontaneous cures has indicated the path. This is at the root of the mastoid beneath the linea temporalis at the level of the superior wall of the osseous meatus and the spina supra meatum, almost always 5 to 10 mm posterior to the latter; the bone usually shows at this spot a greater number of perforating vessels. The tip of the mastoid is only attacked when the cortex in this region is diseased, or a hard infiltration or descending abscess can be felt under the tip. If the antrum is to be entered by the short route, a cone-shaped opening is made at the above-described spot, the tip of the cone being the antrum. This is carefully curetted, all pus and granulations being removed. *Free communication is made between antrum and tympanum* and maintained as long as possible, so that antiseptic solutions can pass freely from one to the other."

Intermediate between Class 1 and Class 2 comes a class of which Hessler (3) is the type. He holds that at times it is necessary to open the antrum in acute empyemas, but at other times it is not. When only the terminal pneumatic cells are involved, he holds that it is entirely unnecessary to enter the antrum. He reports twenty-three cases in which he opened mastoid cells, and removed pus and diseased tissue without opening the antrum. In some of the cases he had originally intended to open the antrum, but when he had curetted and chiselled away the diseased portion and come again on healthy bone, he had fulfilled the requirements of good surgery and therefore decided to stop. Usually a few weeks after the operation Hessler's patients were completely cured, while where he opened the antrum the

treatment lasted months and in some cases years. Of his twenty-three cases, twenty-two made rapid recoveries. One died of tuberculous meningitis. In describing these twenty-three cases, Hessler's statements in regard to time required for complete healing are so indefinite that it is impossible to estimate the average time of after-treatment.

Hessler lays down rules by which suppuration of the antrum may be differentiated from suppuration of the terminal cells. When there is retention of pus in the antrum, the pain to pressure and the swelling of soft parts begin at that spot immediately behind the auricle on a level with the superior meatus. In this region are the fistulas leading to the antrum. In empyema of the cells the findings are different: the abscess lies toward the tip of the mastoid; Hessler confirms the observation of Bezold, that the symptoms of inflammation then appear first at the tip of the mastoid and are circumscribed at this region. This finding Hessler considers almost pathognomonic of empyema of terminal mastoid cells. Abscess formation in neighboring soft parts he also considers characteristic of empyema of terminal cells. In cases of doubt the operation clears up the diagnosis.

The first to draw a sharp boundary line between opening the cells and opening the antrum was Hedinger (4), who says: "I am for absolutely separating these operations, which are not, as a rule, held sufficiently distinct by surgeons, but which surgical anatomy and the clue which nature affords in fistulas of the antrum sharply differentiate."

Bezold (5) reports a case of empyema of the tip of the mastoid where he opened the abscess without opening the antrum, and the case was completely healed in three weeks.

Urbantschitsch (6) holds that in acute empyemas, if there is a fistula leading toward, or an abscess communicating with, the antrum, if meningeal symptoms are at all prominent, if the posterior superior wall of the auditory meatus is bulged forward, then the antrum must always be opened; but when the abscess is at the tip of the mastoid, if none of these symptoms are present the opening and curetting of the abscess suffice without opening the antrum.

In answer to the position taken by Hessler, Schwartz says: "Hessler tries to differentiate, in acute mastoiditis and empyemas of the mastoid cells, between merely opening the cells and opening the antrum. The former procedure he deems sufficient where there is circumscribed empyema of the terminal cells. Without doubt such circumscribed empyemas do occur, but the diagnosis before and during the operation is a doubtful one, so that in every case one is safer to open the antrum mastoideum and to assure oneself that this, the most frequent seat of empyemas, does not contain another focus of infection, for in that case in a short time another operation must be performed. The fact that the signs of inflammation are circumscribed and appear first at the tip of the mastoid, also the appearance of infiltrations and descending abscesses at the tip of the mastoid are by no means a sure proof, as Hessler assumes, that the inflammation is confined to a few terminal cells, but it merely shows that the pyogenic organisms cause the disease to take an anomalous form, perhaps because there are congenital openings in the cortex of the bone, so that they first reach the periosteum at the tip of the mastoid and here cause inflammation. In such cases it is my custom to do as he and others do, always to search first at the tip of the mastoid for pus, but I never rest content with merely opening and removing the tip, but always open on into the antrum and make free communication with the tympanum. *The greater trouble will be rewarded by the greater security of the result.*"

Zaufal, Lucae, Jacobson, Ferrer, Schubert, Hecke, Weil, Körner, Scherer, Küster, Stacke, Riel, Müller, Trautmann, Manasse, Wintermantel, Singer, and many others always open the antrum in acute empyemas of the mastoid.

And now briefly to consider the advantages and disadvantages of the different methods. Politzer has found by experience that the after-treatment of cases operated by the Schwartz method is a much longer one than where the cells are merely opened and drained. In the former case, pus from the middle ear is constantly reinfecting the freshly

curetted bone, while in the latter the wound is soon closed and healed.

Hessler in his twenty-three cases where the antrum was not opened found that the after-treatment was a matter of weeks, where it had formerly taken months and even years.

Every one who has had the after-treatment of these cases operated on for acute empyemas, where the antrum has been curetted and the aditus enlarged, knows how disagreeable and tedious both for patient and physician such after-treatment is, how the pus from the middle ear is constantly bathing the wound, and how well justified Politzer's objections to this method are.

I saw in Politzer's clinic four cases which had been operated for acute empyema of the mastoid cells without opening the antrum, all of which were healed completely within five weeks. Politzer places the time of after-treatment from two to five weeks. I have collected from Grunert and Zeroni's report all of the cases operated in Schwartz's clinic for acute empyema of the mastoid in the last two years, with the time of after-treatment.

Cases (7) operated from April 1, 1898, to March 31, 1899:

- | | |
|---|--|
| 1. F. Meylink, after-treatment 2½ months, patient left clinic not healed. | 11. H. Jost, after-treatment 2 m. |
| 2. Ch. Dahne, after-treatment 2 m. | 12. M. Horning " " 1 m. |
| 3. K. Teichman " 1 m. | 13. B. Düring " " 2 m. |
| 4. O. Gobel " 6 weeks, one side not yet healed, both sides operated. | 14. C. Jung " " 2½ m., not fully healed, result unknown. |
| 5. R. Ziegenhorn, after-treatment 2 months. | 15. A. Dietrich, after-treatment 2 m. |
| 6. E. Mutter, after-treatment 1 m. | 16. E. Bohlman " " 6 m. |
| 7. M. Hessler " " 4 m. | 17. A. Folner " " 2½ m. |
| 8. G. Schneider " " 6 w. | 18. Andreas " " 2 m. |
| 9. E. Muth " " 1 m. | 19. H. Ohlberg " " 6 m. |
| 10. H. Goldschildt " " 3 m. | not healed at time of discharge. |
| | 20. G. Martin, sinus thrombosis, death. |
| | 21. G. Stockman, tubercular meningitis, death. |

An accurate average of the time of after-treatment cannot be made, as a number of patients left the clinic before the wound was completely healed. The average time could not have been less than two and a half months and was probably about three months.

Cases (8) operated from April 1, 1899, to March 31, 1900 :

1. H. Marr, after-treatment	6 w.	21. K. Rolle, sinus thrombosis, death.	
2. W. Gandig " "	3 m.	22. M. Henne, died of pneumonia.	
3. E. Gruss " "	5 m.,	23. A. Pech, died of meningitis.	
not yet healed.		24. W. Heitmann; after-treatment 1	
4. A. Wribel " "	2½ m.	m., not healed.	
5. F. Liebezeit " "	2 m.	25. F. Hempel, after-treatment 2½ m.	
6. H. Frommig " "	2½ m.	26. L. Reinhold " "	1½ m.
7. M. Althaus " "	6 w.	27. M. Krönert " "	2½ m.
8. A. Grimm " "	1 m.	28. H. Jelle, after-treatment 3 m.	
9. Thieme " "	3 w.	29. E. Rosch " "	2 m.
10. A. Vogel " "	4 w.	30. B. Kathe " "	3 w.
11. C. Conter " "	6 w.	31. E. Boutz " "	6 w.
12. O. Reichenbach " "	2 m.,	32. F. Boulke " "	4 m.
not yet healed.		33. C. Fischer " "	1½ m.
13. F. Hohmann " "	4 w.	34. E. Schreck " "	1½ m.
14. H. Bonnkawsky, after-treatment		35. M. Mirdlich	} Still under treat- ment.
3½ m.		36. W. Fuchs	
15. E. Langer " "	4 w.	37. Sheel	
16. L. Schlacht " "	4 m.	38. H. Knapp	
17. F. Bernstein " "	1 m.	39. C. Willner, after-treatment 1½ m.	
18. E. Voigt " "	1 m.	40. O. Hechler " "	2 m.
19. F. Schutze " "	4 m.	41. C. Shiedlo " "	3 m.
20. Knabe " "	1 m.	42. C. Prüfer " "	2 m.

Here, too, the average duration of after-treatment is somewhat uncertain, but is about two and a half months.

If Politzer's cases heal more quickly, if the wounds are cleaner, if the operation is a much simpler one, what are the disadvantages which prevent this method from being universally employed? Schwartz has given them when he opposes the position taken by Hessler, and when he says, "In every case one is safe to open the antrum mastoideum, and to assure oneself that this, the most frequent seat of empyemas, does not contain another focus of infection"; and again, "The greater trouble will be rewarded by the greater security of the result."

Where the antrum is left undrained, the operator must be prepared at any moment to do another operation, and that when the symptoms are urgent, and the condition of the patient far less favorable than at the first one.

Poltitzer says: "If during the course of after-treatment, there should be rise of temperature, headache, nausea, vomiting, etc., one can always do a second operation and search for the cause of these symptoms." But how unpleasant a thing such a second operation is with such symptoms present, and how dangerous to again anæsthetize a patient in such a condition!

The question naturally arises: Is there any means by which

we can combine the advantages of the two methods and eliminate, partially at least, their disadvantages, by which we can get our cases to heal as quickly as Politzer does and still be as safe as Schwartze is? The rules which Urbantschitsch has laid down as to when the antrum must be opened in acute empyemas are sound, and an operator would be taking heavy chances to disregard them. If meningeal symptoms are prominent, if a fistula leads toward the antrum, if the posterior superior wall of the meatus is bulged forward, or when signs of inflammation are localized in this region, then in every case the antrum should be opened.

And now as to the question whether, when none of these symptoms are present, it is safe to leave the antrum unopened.

We can here disregard the question of primary suppurations of the mastoid cells, without involvement of the middle ear, for though such cases have been reported by Toynbee (9) and Zaufal (10), because of their extreme rarity they cannot enter into the consideration of this question.

There are some points in the anatomy of the parts and in the pathology of acute empyemas of the mastoid cells which have a decided bearing on the question, and these it might be as well to touch upon.

The antrum forms the connecting link between the tympanic cavity on the one hand, and the mastoid-cell system on the other. Schwartze and Eysell compare the mastoid cells to a hollow pyramid all of whose axes run toward a common centre, which is the antrum mastoideum. The antrum is a direct continuation, by means of the aditus ad antrum, of the recessus epitympanicus. The superior wall or roof of the antrum is a direct continuation of the tegmen tympani, into which it merges without any particular line of demarcation. The floor of the antrum makes a rather sharp bend, which causes it to form an angle of 90° with the tympanic wall. This is an important anatomical feature; it makes the relation of the antrum to its tympanic outlet just exactly the same as the relation of the antrum of Highmore

to the ostium maxillare. In each case the outlet is almost on a level with the roof of the cavity. For fluid to drain away through the tympanum, the cavity must fill up and overflow at the top.

The walls of the antrum are sieve-like; the openings vary in size; they may be so minute that it is difficult even to establish their existence. These openings are the communications with the mastoid cells.

In two ways the antrum may be a source of danger in acute empyemas: if the mucous membrane becomes swollen because of the peculiar anatomy of the parts, the outlets of the antrum are easily shut off, and an undrained empyema of the antrum ensues; or certain pathological changes occur in the antrum, such as polypoid degeneration of the mucous membrane, formation of granulations, necrosis of the bony walls, etc., which cause the antrum itself to become a focus and disseminator of infection.

In every operation for acute empyema of the mastoid cells, unless the operator makes it a routine practice to open the antrum, he must ask himself these two questions: Is the antrum drained? Has it undergone such pathological changes that it is a focus of infection? If he is in doubt on either of these two points, then he must open the antrum.

When we bear in mind the fact that empyemas of the mastoid cells are always secondary to middle-ear inflammation, and that the antrum always participates more or less in inflammation of the middle ear, then we can readily understand the weakness of Hessler's position when, after opening and curetting an abscess of the cells, because he again comes on normal tissue, he sees no indication for going farther and opening the antrum.

Rapidity in effecting cures does not compensate endangering the patient's life, and if either of these two conditions is present in the antrum the patient's life is certainly endangered. What can and should be avoided, however, is useless curetting of the antrum and aditus.

Over and over again I have seen operators, where there was absolutely no indication for it, curette the antrum and enlarge the aditus. What was the consequence? Pus which

should have drained through the membrana tympani, instead drained out through the antrum and the freshly cleansed bone cavity.

Every time the antrum is opened in acute empyema, the first opening into the antrum should merely be exploratory, and as small as is consistent with exploration of that cavity. If there is no empyema of the antrum, no granulations, no polypoid growths, no pathological changes which indicate it, then widely to open the antrum, enlarge the cavity, make broad communication with the tympanum, so that the pus is constantly reinfecting the wound, seems an absurdity.

If when the antrum is carefully opened no pus wells up, and it will usually well up as if under pressure where there is a closed empyema, and if on careful examination with probe and by inspection no pathological changes are found, then the relations of the parts should be disturbed as little as possible. In this way we can to a certain extent at least combine the advantages of the Politzer method with those of the Schwartze.

Without some exploration, at least, it is impossible to say with absolute certainty what the condition of the antrum is, and of this condition every conservative operator, bearing in mind that the antrum is always more or less involved in purulent middle-ear disease, must convince himself, but the first opening should be merely exploratory, and if he has convinced himself that the antrum is not the seat of danger, then he should at once desist from further disturbing the parts.

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CONTRIBUTIONS TO THE NORMAL AND PATHOLOGICAL HISTOLOGY OF THE PHARYNGEAL TONSIL.

BY FRIEDRICH WEX, ROSTOCK.

IT will probably not be devoid of interest to mention a few historical data concerning the pharyngeal tonsil whose anatomy and pathology have of late received such unusual attention. The study of its normal structure has been awakened by the discovery of the importance of its diseases.

In 1665, C. Schneider was the first to describe and illustrate its anatomy in his book, *De Catarrhis*. Winslow followed in 1733 and Santorini in 1775. The latter was the first to compare it to a tonsil. In 1846, Tortu called attention to the ridges and furrows in the lining coat of the vault of the pharynx, and Lacancher recognized first its glandular nature in 1753. Kölliker confirmed this observation in 1863 and gave 9 *mm* as the thickness of the glandular layer and declared its structure to be identical with that of the faucial tonsil.

Since the thorough works of Luschka, Wendt, and Meyer, aural surgeons have given this subject adequate attention, whereas in their publications anatomists have failed to present the topography and minute structure of this organ with sufficient detail and accuracy.

The pharyngeal tonsil is an organ normally found in every human being. It is of foetal origin and occupies the roof of the pharyngeal cavity from the choanæ to the anterior border of the body of the occipital bone, and extends from one fossa of Rosenmueller to the other. This gland is subject

to very considerable macroscopic variations and consists of a mucous membrane $\frac{3}{4}$ cm in thickness, divided by vertical furrows whose number, depth, and course vary considerably. A deep median and two shallow lateral furrows divide the gland into six ridges which run parallel, and slightly converging at their posterior ends. The furrows are interrupted by transverse bridges. The ridges are yellowish-red and nearly always covered with thick mucus. Its removal uncovers, at the crest of the ridges, the punctate elevations of the mouths of the follicles and gives the surface a granular appearance. The knowledge of the histology of the pharyngeal tonsil in the new-born or the young infant is essential for the proper recognition of the normal structure (for without it it would be impossible to judge of its diseased state). The exposure to all kinds of inflammatory and catarrhal conditions, after the first months of life, usually leaves this gland not entirely normal even if no macroscopical alterations are observable.

In common with other authors that have examined the gland of the new-born, the authors distinguish three divisions in the cross-section of a well-developed ridge: 1st. Epithelium with basement membrane; 2d. Propria; 3d. Submucosa.

1. The epithelium is of the ciliated columnar type, 0.11 mm in thickness, and consists of a fine layer of columnar cells ciliated above and conical below, slightly granular, with an intensely stained nucleus in its lower third. This layer is supported by a stratum of six rows of cubic and ovoid cells, of which the uppermost row sends out long, spindle-like processes between the lower portions of the columnar cells. The cubic cells contain quite a large nucleus surrounded by a moderate amount of protoplasm. A continuous row of cubic cells with well-stained nuclei form and define the basis of the epithelial covering. These three epithelial layers rest upon a fine even band without definite structure, known as the basement membrane.

2. The propria or the true adenoid tissue has 10-20 times the thickness of the epithelium, to which it runs parallel. The frame of this layer is a network of very fine connective-

tissue fibres which support faintly stained spindle cells at their intersections. These structures are observed only in pencilled specimens. The reticulum contains, especially in children, numerous blood-vessels, lymphatics, and capillaries, whose walls help in making up the structure of the reticulum. Small cells with well-stained nuclei and little protoplasm fill and completely hide the supporting structure. The irregularly distributed round cells occur in greatest numbers around the blood-vessels and may give indication of follicle formation.

3. The submucosa consists of a wide stratum of scantily nucleated fibrous tissue which runs in undulating bands parallel to the surface and contains the blood-vessels and lymphatics. These are frequently filled with leucocytes and surrounded with cellular infiltration. The bulk of mucous glands are located at the base of this layer. Their bodies are made up of ramified and convoluted tubes lined with nucleated columnar epithelium. The juxtaposition of two ridges creates a slit-like depression for the reception of glandular secretion.

The basilar fibro-cartilage subjoins this layer. It forms no part of the gland. The author has also investigated the finer anatomy of the lymphatic cells of the pharyngeal tonsil. The round cells of this organ in the new-born and young infant are pure lymphocytes with molecular contents. No acidophile or mast-cells or hyalin globules were observed. (Examined with Ehrlich's triacid solution.)

All but one specimen were lined with ciliated columnar epithelium. Slightly horny epithelium covered the tonsillar surface in a single instance of a five-day-old child, without extension into the lacunæ or into the mouths of the ducts. The merging of columnar into squamous epithelium could be plainly seen. The author has also investigated the extent of the elastic tissue in the pharyngeal tonsil with the Orcein method of Unna-Taenzer. The submucosa supports a network of firm elastic fibres which run in a longitudinal direction and surround densely the glandular substance and blood-vessels. Fine elastic fibres run parallel to the surface near the edge of the propria, whence fibres proceed into the

lymphoid tissue almost at right angles. Fine elastic fibres run lengthwise directly under the epithelium and extend up and into the basement membrane.

All authors regard the epithelial cell infiltration in later life as a normal process, and ascribe any abnormalities to changes in the glands and blood-vessels. If no pathological conditions supervene, the elevations become more prominent and the glands and blood-vessels diminish.

For the minutiae of the microscopic appearances of post-nasal hyperplasia and tuberculosis the reader is referred to the original.

The author's cases of tuberculosis of the pharyngeal tonsil are sufficiently important to justify their publication.

CASE 1.—The columnar epithelium is well preserved even in the crypts, and is fringed with ciliae of unusual length. The fibrous tissue and blood-vessels are moderately developed and the vascular walls are not thickened. The follicular outlines and germinal centres are easily recognizable. Macroscopic inspection of the specimen shows the centre insufficiently stained with the acid solution of brown hæmatine. Ten or twelve tubercle nodules, which occupy the adenoid tissue of the lobule, become confluent in deeper sections, show central cheesy degeneration, many typical giant-cells of Langhans, and a few tubercle bacilli.

CASE 2.—Patient three and a half years old. Ciliated columnar and squamous epithelium line the cross-section of the post-nasal tonsil, which is well supplied with fibrous tissue and blood-vessels. Hemorrhage into the central portion of the tonsil separates the adenoid tissue into irregular surfaces, which present tubercle nodules with multinuclear giant-cells and cheesy degeneration. In the vertical sections of the specimen the same formations are present and extend to the epithelium, which is everywhere intact. One unmistakable tubercle bacillus is found.

CASE 3.—The larger part of the cross-section of the specimen is covered with ciliated columnar epithelium; the remainder with the squamous variety, and its substance has a subnormal fibrous and vascular supply. Small tubercle nodules are irregularly distributed through the section from the basis to the epithelium. A small number of tubercle bacilli are present.

CASE 4.—Two parts of this tonsil, which was removed piecemeal, contained confluent miliary tubercles, tubercle bacilli, and giant-cells without cheesy degeneration.

CASE 5.—A section of a large tonsil from a five-year-old patient shows ciliated columnar epithelial covering, the fibrous tissue well developed, hypertrophy and hyaline degeneration of vascular walls, and distinct follicles. The well-marked tubercular deposit at the base of the tonsil contains typical large giant-cells. Similar tubercular formations in the vertical sections of the tonsil show tubercle bacilli, but no cheesy degeneration.

CASE 6.—Stratified squamous epithelium covers almost entirely this section, which has a poor fibrous and vascular supply. Confluent and degenerated tubercles of varying size are disseminated through the adenoid tissue and epithelium, which they partly destroy. Giant-cells and tubercle bacilli are scantily present.

CASE 7.—Processes of stratified squamous epithelium which covers the surface of this tonsil extend into the adenoid tissue. A circumscribed focus of firm hyaline connective tissue with a few round and spindle cells adjoins the basement membrane, similar in appearance to the hyaline degeneration of tubercular glands. A second focus is separated from this by a strip of adenoid tissue, which resembles closely an epithelioid tubercle. Their tubercular nature is not without doubt. The former cannot be regarded as a hyaline tubercle unless associated with other symptoms of tuberculosis, and the latter may be taken for a foreign-body tubercle due to epithelial degeneration.

In doubtful instances of this kind the presence of tubercle bacilli decides their nature; they are, however, not present. The author regards these formations as tuberculous because epithelial degeneration is not evident, the epithelioid tubercle contains leucocytes with rolled-up nuclei, and hyaline nodules are present, which are usually found in tubercular lymphatic tissue, but rarely in association with foreign-body tubercles.

Reviewing his own cases, the author describes his method of research for tubercle bacilli. He found the latter in six cases out of seven. Lermoyez and Brindel only found them once, Gottstein and Brieger found none, and Pluder found them in each one of his cases. He records the results of the following observers:

	in 100 cases	o cases of tuberculosis	
Broca			
Gottstein	" 33 "	4 " "	"
Lermoyez	" 32 "	2 " "	"
Brindel	" 64 "	8 " "	"
Pluder	" 32 "	5 " "	"
Luzzatti	" 50 "	2 " "	"
Brieger	" 78 "	5 " "	"
<hr/>			
Total in	389 cases	26 cases of tuberculosis,	6.7 %
In his	210 "	7 " " "	3.3 %
<hr/>			
In all	599 cases	33 cases of tuberculosis =	5.51 %

The author accounts for the small percentage of pharyngeal tuberculosis in his series of examinations principally by the fact of the greater exemption from tuberculosis by the inhabitants of that part of the country. A reference to 21 authors concludes this valuable contribution.

AURAL COMPLICATIONS OF SCARLET FEVER. WITH 12 POST-MORTEM OBSERVATIONS.

By BERNHARD VON GAESSLER, MUNICH.

Abridged Translation by Dr. O. JOACHIM, New Orleans, La.

AURAL complications of scarlet fever were not recognized by the medical profession until the second half of the eighteenth century. Between the years of 1775-78 Bang, Eichel, de Mezza, Aaskow, and Read first observed a copious foetid aural discharge, to which the profession in subsequent years attached varying degrees of importance according to the prevailing frequency and intensity of the complication. Struve (1) describes an epidemic of scarlet fever lasting from 1799-1802, notable for the frequency of severe ear affections. Berndt (2) observed in 1825 and 1826 next in frequency to dropsy the occurrence of a foetid otorrhœa one or two weeks after convalescence. Dr. Weisse (3) mentions in an article, published in 1856, an epidemic of scarlet fever and measles in an educational institute in Petersburg, during the prevalence of cholera, in which he was keenly impressed by the prevalence of aural discharges and abscesses of the lymphatic glands and the absence of cerebral complications and anasarca. According to Baader's (4) observation of two epidemics, the frequency of this ear complication averaged 23 %. A recent extensive statistic of Weil (5) gave an average of 10 % of otitis in scarlet fever. The great importance of this disease and its consequences to the ear impelled otologists to study it carefully, and they were the first to point out the damage to the function of the organ and even to life.

Oscar Wolf (6) found in twenty-eight cases of exfoliative otorrhœa 64 % due to scarlet fever. In forty-six cases of mastoiditis operated upon by Walter Sherrer (7), three were due to scarlet fever. The etiological rôle played by scarlet fever in the causation of ear disease ranges according to different authors from 5 % (Zaufal) (8), to 7.14 % (Knapp) (9), to 10 % (Tschärner) (10), who, however, includes diseases of the external auditory meatus.

In deaf-mutism this disease is of still greater etiological importance. Careful statistics compiled in the kingdom of Saxony show 42.6 %, in Norway 13.8 %, of deaf-mutes due to scarlet fever. Bezold (11) found in 640 patients 984 diseased ears due to scarlet fever; 37 organs had acute and 667 chronic otorrhœa. In 25.2 % the drum membrane was totally destroyed; in 48.5 % whispering voice was audible only $\frac{1}{2}$ meter; in 13 % deaf-mutism or inability to perceive whispering existed.

The relation of ear complications to scarlet fever has found varied interpretations. Hufeland, who wrote in 1839, regarded them as metastatic. Jarsley (12) held the diseased mucous membrane responsible in the majority of cases. Kraemer (13) in 1849 denied the causation of ear disease by the diseased naso-pharynx in scarlet fever. Wilde (14) regarded the ear disease in exanthemata as a consequence of naso-pharyngeal disease and pointed to the Eustachian tube as the connecting link.

Heydloff (15) expressed a similar opinion, and stated in addition that the damage to the ear due to scarlet fever or diphtheria could not be distinguished. Of the same opinion was Burkhardt-Merian (12). Demme (16), Henoch, and Heubner (17) pleaded for a discrimination between these conditions. Wolff (18) also made a distinction between them, and held the scarlet-fever diphtheria, including otitis diphtheritica, as an evidence of the intensity of the systemic infection. Moos (19) found an etiological difference between genuine diphtheria and mild cases of scarlet-fever diphtheria. The consequences to the ear, in his opinion, were identical, as in either case a mixed infection prevailed. Hartmann (20), Kessel (21), and Schweighofer (23) have

proven the existence of genuine diphtheria of the ear due to the Klebs-Loeffler bacillus. Moos separated from the mild cases the necrotic scarlet-fever angina, which propagates itself to the ear by invading the blood-vessels with masses of streptococci and thereby produces a panotitis. He held that the infection might travel through the Eustachian tube or through the lymph channels alongside of the tube. Gottstein (22) laid stress upon the systemic infection, and expressed the opinion that in the exanthemata the ear is a place of predilection for the deposit of their toxins. Voss (24) pointed out the correlation of otitis and nephritis, and thought that their onset and course should prevent us from attributing all cases to diphtheria. Haug (25) said: "In the beginning we deal with a pure nosogenous ear affection, upon which a mixed infection may easily engraft itself." He distinguished between the rather rare but severe form which occurs at the height of disease, and the more frequent, milder post-exanthematic form which occurs during desquamation. Weil (5) was of opinion that a mild middle-ear disease existed in all cases of severe scarlet fever, which he recognized by slight alterations on the drum membrane, and which he attributed to systemic infection. He admitted the aggravating influence of secondary infection.

The present writer examined the ears of 54 children during scarlet fever of mild type and found the drum membrane affected in 83.2 %. In 20.37 % hyperæmic conditions were present. In 14 out of 16 cases a functional examination showed normal hearing. In 9 of these the drum membrane showed an abnormal condition. In 2 cases of unilateral defective hearing (3 and 4 *m*) the drum was in one case depressed; in the other it showed a posterior stripe of opacity. In 65 cases, 7.69 % of otorrhœa (5 cases) existed, twice bilateral, in 3 cases unilateral. Scarlet-fever diphtheria was present in 2 cases. The author presents a record of autopsies and examinations of the petrous bones of 12 fatal cases of scarlet fever.

CASE 1.—Child two years old; death on second day after appearance of eruption. In retromaxillary fossa, enlarged lymphatics. Large lobulated adenoids in the naso-pharynx extend to

the ostium tubæ, which is free. Physiological dehiscence the size of a pea persists. Slight injection of the long process of the malleus and of the periphery of the drum membrane in posterior superior segment. Cavities of middle ear empty and lining membrane not swollen. Slight recent vascular injection at different points.

CASE 2.—Nine and a half years old. When admitted, eyes, ears, and nose normal, soft palate and uvula intensely red, tonsils enlarged. Swollen submaxillary glands. Culture examinations show staphylococci pyog. alb., aur.; streptococci, and scattered diphtheria bacilli; death on third day after appearance of eruption. Inspection of the *Mt* shows a striated reflex. The slightly hypertrophied adenoids and the openings of the Eustachian tubes are pale. Middle-ear cavity empty. A minute hemorrhagic spot under the tegmen. Moderate injection and thickening of the mucous membrane of the floor of the middle ear, over the bony portion of the tube and on the periphery of the inside of the drum. A normal dehiscence not noticed.

CASE 3.—Five and a half years old. Tonsils covered with dirty-white membrane, muco-purulent nasal secretion. Death four days after appearance of eruption. Enlarged retromaxillary glands. Pharyngeal tonsil enlarged. Normal dehiscence present in anterior lower wall of meatus, which is full of tenacious, muco-purulent secretion. Epidermis of the *Mt* shows a bleb-like elevation. Middle ear, aditus, and antrum are filled with straw-colored, tenacious secretion. The lining membrane appears grayish red and thickened, especially around the ossicles and in the antrum, where two small granulations can be seen. The drum membrane is perforated in upper posterior segment but does not appear thickened.

CASE 4.—Four and a half years old. Pharynx red, tonsils covered with dirty-gray membrane. Had measles four weeks previously. Death four days after appearance of scarlet-fever eruption. Chronic cheesy tuberculosis of peribronchial lymphatics. Beginning glomerulitis of both kidneys. In nose and nasopharynx no notable alterations. In anterior wall of bony meatus a dehiscence. Drum membrane of yellow appearance in upper posterior segment, with its lower edge concave and sharply defined. Recent vascular injection of the inner surface of cavity of middle ear, antrum, and bony portion of tube. Thin, fluid pus in

the recesses of the round and oval windows, a small amount of purulent secretion in the cavity of the middle ear.

CASE 5.—Seven months old. Scarlet fever following measles. Except the absence of reflexes the condition of the ears and throat normal when admitted. Death six days after appearance of eruption. Scarlatinous septic diphtheria of nose, pharynx, larynx, and trachea, confluent lobar pneumonia, fibrinous pleuritis. Recent inflammation of the pharyngeal tonsil and lips of the Eustachian tubes, which are covered with diphtheritic deposit. Parotid gland purulently degenerated. Dehiscence in anterior wall of meatus persists. Drum membrane grayish white, dull, covered with a thickened epidermis. The removal of the tegmen tympani discloses thick creamy pus under pressure. The entire lining membrane of the middle ear and adnexa and of the ossicles is greatly thickened and diffusely injected. Granulations on the lower half of the drum membrane, which is still transparent. Hemorrhagic points on the floor of the aditus.

CASE 6.—Patient four years old. Status on admission: Fœtid smell of breath; lips, tonsils, tongue, and fauces covered with dry gray deposit. Tonsils much enlarged. Coryza. Nephritis. Death seven days after appearance of eruption. The hypertrophied lobulated pharyngeal tonsil and the mouth of the tube are covered with membranous exudates. Pus in atlanto-occipital joint. No dehiscence in bony anterior wall of meatus. Membrana tympani of diffuse grayish-red color; the lower half covered with firm exudate. No perforation. A similar exudate fills the cavity of the middle ear and envelops and adheres closely to the ossicles and antrum wall and extends quite into the tubal opening. The mucous membrane is moderately injected and not greatly thickened. The cartilaginous portion of the tube is free from exudate, but its lining membrane hemorrhagic, swollen, and uneven. The cell membrane is succulent, thickened, pale red, and filled with purulent secretion.

CASE 7.—Patient three and one half years old. Death on seventh day after eruption. No alteration in pharynx or nasopharynx. External auditory meatus completely filled with macerated epidermis. Physiological dehiscence present. Vascular injection of long process of malleus and posterior half of drum, which seems otherwise intact. From a hemorrhagic point near the umbo, creamy pus escapes during cleansing of the macerated

membrane. The superficial cells under the tegmen, the cavity of the middle ear, the antrum, and the inner opening of the Eustachian tube filled with thick pus. The mucous membrane is everywhere thickened, and over the promontorium injected.

CASE 8.—Patient two years old. When admitted, had indistinct exudate on both tonsils. Death a week after appearance of eruption. Croup of larynx and trachea. Normal dehiscence present. Color of external surface of drum membrane normal, with slight vascular injection of handle of malleus and along the upper posterior wall of the meatus. In the cavity of the middle ear, partly muco-purulent and partly sero-purulent accumulation. The mucous membrane is slightly swollen and of grayish-red color on the floor of the middle ear, on the bony portion of the tube, and in the posterior part of the antrum and adjacent cell. On the hypertrophic pharyngeal tonsil punctiform red spots.

CASE 9.—Patient nine months old. Admitted on account of ranula and acquired scarlet fever. Right drum shows diffuse redness, left shows dulness and absence of light reflex. On the third day the redness of right drum has disappeared. Death a week after appearance of eruption. Pharyngeal tonsil and ostium tubæ somewhat thickened and injected. The anterior wall of meatus still undeveloped. The drum membrane dull and covered with thickened epidermis. Transparent redness of anterior-lower segment. The middle-ear cavity, aditus, and antrum full of creamy pus. Dark granulations are seen on the intensely red and succulently swollen mucous membrane. This condition of the mucous membrane is less pronounced on the inner wall and subsides about the head and anterior limb of the stapes. The mucous membrane lining the inner surface of the drum shows a few enlarged capillaries and, when illuminated, a number of punctiform reddish elevations. The moderate swelling of the mucous membrane over the bony portion of the tube is not present in the cartilaginous portion.

CASE 10.—Patient four and one half years old. Death thirteen days after appearance of eruption. Pharynx and mouth of Eustachian tube free. Indication of normal dehiscence. Drum membrane normal; under the tegmen normal cells. In middle-ear cavity and in antrum a very small quantity of thin, fluid, muco-purulent secretion. The lining membrane seems thickened and injected over the promontory and stapes. The membrane

in the cells adjacent to the antrum is slightly infiltrated and red.

CASE 11.—Patient eleven and one half years old. Death fifteen days after appearance of eruption. The enlarged post-nasal tonsil and the pharyngeal mouth of tube intensely red and irregularly injected. Physiological dehiscence is closed. Drum membrane and light reflex normal. The cavities of the middle-ear empty and their lining membrane nowhere swollen. Faint vascular injection over promontorium and bony portion of tube, where some muco-purulent secretion is located.

CASE 12.—Patient seven years old. On admission has copious nasal secretion and bleeds easily from nose. Death forty to forty-five days after appearance of eruption. Normal dehiscence closed. Drum membrane normal except for an injection along the posterior edge of the malleus. The cells under the tegmen are full of clear mucus. In the middle-ear cavity the secretion is somewhat more viscid and of yellowish color. A few enlarged capillaries run over the intensely swollen mucous membrane. This condition is aggravated in the mucous membrane of the antrum and cells.

Death resulted in most of the cases from complications of the lungs and kidneys. Diphtheritic membranes were present in 2 cases, lacunar tonsillitis in 1 case in which streptococci and diphtheria bacilli were found. The investigation of the dehiscence in the anterior osseous wall of meatus showed that complete closure occurred between the ages of three and five years. The conditions noted in the external auditory meatus were of no special significance. The drum membrane showed important alterations in 3 cases. In 1 an exudate existed upon the lower half, in 2 others perforations. In the 7 cases, various abnormalities were present, but they were neither uniform nor peculiar. In 2 cases a normal condition prevailed. The middle ear, the adjoining cavities, and the tympanic Eustachian opening were involved in every instance in different degrees and ways. The simple cases showed limited injection and swelling of the membrane, some secretion in the bony portion of the tube, with otherwise empty cavities. In other cases, sero-mucous and muco-purulent secretion existed in the cells

under the tegmen and in the cavity of the middle ear, with considerable swelling and injection of the mucous lining of the middle ear, aditus, and antrum. In the severe cases, thick and purulent secretion filled all the cavities, which were lined with thickened, injected, granulating, and hemorrhagic mucous membrane. These conditions were, in some instances, more pronounced on the promontorium, in others on the antrum or in the tympanic ostium of the tube or on the intact or perforated drum. They were coexisting with a muroid secretion as well as with a perforation of the drum, and in one case the middle ear and bony portion of the tube seemed filled with a semi-solid exudate. The cartilaginous portion of the tube showed, in this case, injection, swelling, and hemorrhagic spots. In all other cases this portion of the tube seemed normal. The deposit of membrane about the pharyngeal opening of the tube always ceased abruptly just within the mouth of the tube.

The behavior of the scarlatinous diphtheritic deposit showed great variation. In some cases the pharyngeal tonsil, the lips of the tube, the nose, mouth, larynx, and trachea were involved; in others the deposit was limited to the pharynx and larynx. Simple swelling of adenoid tissue and injection were noted in some, and in other cases inflammatory evidences were seen in the pharynx or about the mouth of the tube in all degrees of intensity. The lymphatic glands of the retromaxillary fossa were invariably enlarged and on section showed fatty infiltration.

The author arrives at the conclusion that his observations tend to show a relation of the middle-ear disease to the exanthem. Simple hyperæmia, secretory process, fibrinous exudate, form the progressive states of the ear disease due to infection. In the only case where no material alteration was found, the length of time since the initial infection may have permitted the subsidence of the ear symptoms while the nephritic condition supervened with fatal result. The fibrinous deposit in the middle ear, in the pharynx, and on the tubes, and the purulency of the atlanto-occipital joint present the most intense state of infection. In this single instance in which the cartilaginous portion of the tube

showed evidences of recent inflammatory alterations, the opinion of Moos, that the infection can spread along the tubal mucous membrane, seems tenable. The normal condition of the cartilaginous tube in all other cases lends strong probability to the view that the ear disease is a manifestation of the general infection and not an extension of the infectious process in continuo. While the relative small number of examinations only permits the expression of a probably invariable participation of the ear in scarlet fever, they show that pronounced inflammatory processes can exist behind a normal or nearly normal drum membrane. In scarlet fever, the condition seems analogous to measles and diphtheria, in which an invariable participation of the ear has been proven. The experience gathered in variola, meningitis, recurrent fever, typhoid, and typhus proves that ear complications take first rank in the infectious diseases. Fruitnight (26) found in five thousand cases of exanthematous diseases, especially measles and scarlet fever, otitis media as the most frequent complication.

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AN ANALYSIS OF RINNE'S EXPERIMENT.

BY PROF. BEZOLD OF MUNICH.

COMMUNICATION PARTLY DELIVERED AT THE IX. MEETING OF THE GERMAN
OTOLOGICAL SOCIETY AT HEIDELBERG, 1900.

Translated and Abridged by H. A. ALDERTON, M.D., of Brooklyn.

IN my report upon the ear patients treated from 1881 to 1883, inclusive,¹ I have, for the first time, in all cases of hardness of hearing of long duration, whose tympanic membranes offered no certain evidence for the localization of the disease, made the result of Rinne's experiment the standard for the differential diagnosis between diseases of the middle ear, the internal ear, and the mixed forms of both diseases.

The principle governing my use of Rinne's experiment has been accurately defined in my article, "Statistische Ergebnisse ueber die diagnostische Verwerthbarkeit des Rinne'schen Versuches,"² and in later works.

In the twenty years during which I have, in all appropriate cases, used this experiment, I have been able to convince myself sufficiently of its reliability and ease of application.

Notwithstanding the newer functional methods of examination (the introduction of the continuous tone series, Weber's and Schwabach's tests, upper and lower tone limits, tone gaps) I still, as heretofore, consider Rinne's experiment our most important and, in certain cases, our only decisive test as to the locality of the diseases present, where the objective examination of the ear fails to give us other evidences.

¹ *Archiv f. Ohrenhkl.*, Bd. xxi., S. 248.

² *Zeit. f. Ohrenhkl.*, Bd. xvii., 1887.

Each of the other above-mentioned tests may fail to give us in certain cases a positive result.

The absence of a large part of the lower end of the tone scale by air-conduction is, indeed, a never-failing occurrence in chronic diseases of the sound-conducting apparatus. But, according to my experience, this may also occur with diseases situated in the cochlea or in the acoustic nerve. To be sure, in such a case the bone-conduction (cranio-tympanic) will also to a like extent be lost, while in middle-ear affections it is regularly found increased. But here, because of the strong mechanical vibration produced by the application of the lower-toned forks to the head, the distinction between feeling and hearing is difficult, and in certain cases the results are open to doubt. For this reason, we must generally, in deaf-mutes, dispense with the test by bone-conduction.

Defects in the upper end of the hearing field, extending over a great part of that covered by the Galton whistle, certainly permits no doubt as to the existence of a disease in the nervous apparatus. But extensive defects here, even gaps, may occur in an otherwise well-marked picture of so-called sclerosis.

There can exist no doubt as to the untrustworthiness of Weber's experiment; best demonstrated by the manifold illusions as to the persistence of hearing after loss of the cochlea.

We can still give a relatively certain confidence to the testing of the duration by bone-conduction. If the tuning-fork is employed in such a way that it is first held to the vertex until the vibrations have ceased, as distinguished from the inverse method, in which the cranio-tympanic conduction of the patient surpasses that of the examiner, then the experiment is independent of the strength of the stroke given to the tuning-fork, and it determines only the threshold value of the patient and of the examiner. But threshold value is accounted both in physiology and in psychology among the unreliable methods. Defects still exist in this experiment, as is shown in its use.

Where, of course, the duration of bone-conduction on the

vertex of the patient is very much diminished or quite abolished, or where, on the other hand, it is found to be considerably increased, for example, fifteen seconds or more, then we need have no fear as to the diagnostic application of the results. But in the case of only relatively lessened positive or negative differences in time, then we are, especially with the deep tuning-forks (which are generally used for Schwabach's experiment), very dependent upon the acuteness of observation and attentiveness of the person examined, and further, also, upon the manifold peculiar noises of our environment. For instance, since the installation of an electrical street railway near our examining room this experiment has lost in reliability.

Anomalies in the roof of the skull, traumatic changes with depression, growing together of the bone and dura, etc., according to many observations made in our clinic on patients of the psychiatric division, seem to be not without influence and to complicate the results of Schwabach's test. Dr. Wanner will later present preliminary communications concerning this point, which first drew my attention to a striking shortening of bone-conduction, with otherwise normal hearing, induced by such anomalies of the skull.

The Rinne experiment, with the a¹ tuning-fork used by us¹ applied to the mastoid portion, not to the vertex, is relatively free from the defects here cited.

The patients can much easier and more sharply differentiate the rather high note of this fork from the outside noises, than that of the deep, large A or the small c fork. The short distance from the cochlea, when the tuning-fork is applied to the mastoid portion, lessens or quite excludes the disturbing influence of anomalies of the skull.

But the resulting figures, given by Rinne's experiment, are therefore more definitely and in consequence of this more easily measurable than those of Schwabach's experiment, because it involves much more widely separated extremes than the latter.

Rinne's experiment measures the time during which a tuning-fork is still heard by air-conduction after having

¹ Described in *Zeit. f. Ohrenhkl.*, Bd. xvii., 1887.

ceased to be heard on the mastoid portion following a suitably strong stroke, or, where (in diseases of the sound-conducting apparatus) the bone-conduction lasts longer, inversely the time that the bone-conduction exceeds the air-conduction. If in a given case we denote by τ the total time during which, after the strongest stroke, the tuning-fork is heard by air-conduction, and by θ the total time during which, after a similar stroke, it is heard on applying its handle to the mastoid portion, then Rinne's experiment measures the difference between these two times thus, $\tau - \theta$.

In this difference occurs now not only, as in Schwabach's experiment, the lengthening or, on the other hand, the shortening of the bone-conduction up to extinction, but besides and simultaneously also the abbreviation of the hearing time by air-conduction for the measured tuning-fork.

The following different possibilities follow from the result of Rinne's experiment :

In completely normal hearing, air-conduction always preponderates, in the case of the tuning-fork used by us (a') 30 seconds on the average. The difference $\tau - \theta$ equals therefore in the normal ear $+ 30$ (seconds).

With increasing lengthening of the bone-conduction and simultaneous shortening of the air-conduction, this positive figure approaches very quickly to the value ± 0 . If the bone-conduction is still further lengthened with simultaneous progressive shortening of the air-conduction, then the latter is exceeded by the former, and the expression $\tau - \theta$ changes to a negative figure, which, with the tuning-fork a' employed, can reach 15 (seconds) or more. Finally if the air-conduction is shortened up to 0, with the bone-conduction still persisting, only the bone-conduction remains; in this case, the difference $\tau - \theta$ (τ here = 0) takes the value of $-\theta$.

But if the air-conduction and the bone-conduction are simultaneously and equally shortened (as we may assume *a priori* in diseases beyond the conducting apparatus), then the difference $\tau - \theta$ remains nearest to that in the normal, namely $+ 30$, although the bone-conduction (measured by means of Schwabach's test) is constantly further

shortened with increasing hardness of hearing. If such a hardness of hearing advances still farther, then the air- and bone-conduction both decline according to the rule until finally the bone-conduction is abolished, *i. e.*, $\theta = 0$. In this case, only τ remains of our expression $\tau - \theta$, and we denote this result of Rinne's experiment by $+\tau$.

This method of denotation, introduced by myself, I wish once more to recall to your recollection and somewhat further to enlarge upon.

If the end of the handle of the tuning-fork is set firmly on a stand, the tuning-fork ceases to ring much more quickly than if the end of the handle is free in the air.

If the tuning-fork a' , used in Rinne's experiment by myself and my pupils, after the strongest stroke, is held with the ends of the prongs directly before a normal ear, it is audible for 80 to 90 seconds; whilst after an equally strong stroke, with the handle applied to a table-top it becomes inaudible (the prong ends likewise being approached as near as possible to a normal ear) in about 25 seconds; and if set upon a rubber pad, in about 10 seconds.¹

By hindering the motion of the end of the handle we can also hinder the vibrations of the struck prong ends, and the stronger the end of the handle is pressed, just so much quicker do the tuning-fork prongs lose their vibratory ability.

It is self-evident that in the judgment of numbers obtained by the testing of bone-conduction (Schwabach's test), we must take into consideration this strong obstacle to vibration which the tuning-fork experiences when its handle is fixed on a more or less firm pedestal. Yet much more is this the case for the numbers obtained by testing the difference between bone- and air-conduction—*i. e.*, Rinne's experiment.

From the beginning I have laid stress on the fact that, in using the test in the way we are generally accustomed to do,

¹ The duration is very dependent upon the character of the rubber pad. A harder, less flexible rubber pad reduces the duration much sooner than one as thick but softer and more flexible. In quite an analogous way, we must also accept that the consistency as well as the thickness of the soft parts covering the skull are able to influence the duration of bone-conduction.

we must not simply compare air-conduction and bone-conduction, but take into account the damping of the bone-conduction experienced by the tuning-fork through the application of its handle to the head.

If, after the strongest stroke, the a^1 tuning-fork is applied to the vertex of a person, and we bring our ear as near as possible to the prong ends, we find that it rings only about 18 seconds¹; in other words, only one quarter as long as when the tuning-fork rings out, with the end of the handle free and unhindered before our ear.

For example, if we obtain, in a pathological case, for Rinne's experiment the resulting number—10—*i. e.*, if the a^1 tuning-fork, after having ceased to be heard while held freely before the ear canal, is still heard ten seconds more on applying the end of its handle to the mastoid, then is the Rinne experiment, as opposed to its result in the normal ear (+ 30 seconds), not only 30 + 10 seconds shortened, but the latter number has at least a fourfold value, and the pathological variation of the Rinne experiment in the examined ear from that in the healthy ear does not amount to 40, but really to 70 or more seconds, expressed in time of air-conduction.

When Zimmermann, therefore, holds the bone-conduction not directly comparable with the air-conduction, because in the former the vibrations in the handle, while in the latter the vibrations in the prongs, are auscultated, the objection may be accounted as justifiable.

His further conclusions, which seek to overthrow the whole generally rather valuable theory of sound-conduction in the ear, will be as little followed by most physiologists and otologists as by myself, and I, myself, see the less occasion any nearer to agree to the same, since he, in his tuning-fork experiments, presents an arrangement which appears up to the present as not qualified to yield serviceable results.

For instance, Zimmermann compares together tuning-fork handle and ends in like attitude before the ear canal

¹ Upon a skull devoid of soft parts the tuning-fork rings longer; the soft coverings of the skull exercise therefore a similarly strong damping influence on the vibrations of the tuning-fork, as does a piece of rubber on the table.

("Stimmgabelstiel und-Enden 'miteinander in gleicher Haltung vor dem Gehörgang").

At all events, it would seem that he holds the tuning-fork handle, as well as the prongs, in the direction of its length before the ear canal.

It is easily understandable that Zimmermann thereby obtains very much shorter durations of hearing for the handle than for the prong ends, when we figure to ourselves the mechanism of the vibrating tuning-fork.

A tuning-fork which vibrates with its fundamental tone remains, as is known, on both its nodal points, which lie at complete rest, opposite to each other near its lower prong ends. The great amplitudes, which both prongs execute with their upper ends, correspond to small amplitudes, which the arch enclosed between the two nodal points of the tuning-fork produces. The radius of the arch is larger while the prong ends are farthest apart—*i. e.*, the arch flattens; the radius is smaller while they approach—*i. e.*, the arch projects towards the handle. The handle itself does not generally vibrate independently, but conveys only the movements of the arch away, and indeed the handle itself moves only in a purely longitudinal direction, while the prongs vibrate in a transverse direction. So long as the prongs still move, the arch of the fork and, with it, the handle can never come completely to rest.

Air condensation and rarefaction can only exist in the direction in which the prongs, as distinguished from the handle, move. But if the directions of vibration occur perpendicularly to each other, then the vibrations of the prong ends are most completely heard when their lateral surfaces, so far as possible, stand parallel to the tympanic membrane—*i. e.*, perpendicular to the axis of hearing, or, what amounts to the same thing, when the fork is turned 90° on its axis and the space between the prongs is before the ear canal. But the vibrations communicated from the arch to the handle are only heard when it is held in the prolongation of the axis of the ear canal—*i. e.*, with its end towards the ear canal.

¹ Compare "Unzulängliche Stütze der Helmholtz'schen Theorie," etc. *Zeit. f. Ohrenh.*, Bd. xxxvi., S. 209; and *ARCH. OF OTOL.*, xxix., p. 343.

What we hear when the handle is placed lengthwise of the auricle is probably only the vibrations of prong ends conveyed through the air to the ear and the smaller vibrations of the nearer-lying arch. Thereby comes into play, according to the manner in which the tuning-fork is held, in a wholly uncontrollable way, the interference which exists, as is known, in the direction of the four tuning-fork edges.¹

But there is another simple method by which we can also bring the shock of the tuning-fork arch communicated to the handle into most effectively favorable direction to the axis of the canal, and by this means also experimentally show easily the correctness of the theoretical postulate that the vibrations of the arch communicated to the handle last as long as those of the tuning-fork prongs.

At the eighth meeting of the German Otological Society, I briefly described an experiment, which I beg to present more fully, because it offers a general therapeutical interest, in so far as it allows us to compare air- and bone-conduction in a more exact way than was possible by the former use of the Rinne experiment.

The experiment is as follows:

If the tuning-fork a¹ be placed first with its handle upon the mastoid portion, then held with its prongs directly before the ear canal, until in both places, one after the other, it has ceased to be heard, and we then place its rounded-off handle with moderate pressure within the ear canal so that the lumen is closed, this tuning-fork is once more heard on the average for twelve seconds longer.

In the same manner the whole remaining lower and higher tuning-forks are heard a greater or lesser number of seconds when their handles are so placed in the ear canal, after their prongs have ceased to be heard before the ear canal.

Only with the very high tuning-forks, from c^{IV} upwards, does this experiment fail (which, because of their far-reaching audibility by air-conduction, we need not wonder at).

By this experiment is shown directly and incontestably the

¹ When we auscultate the tuning-fork on its prong ends, and instead of the surface or the space between the prongs hold one of its four lateral edges before the ear canal, the duration of hearing is thereby alone shortened to about one third—e. g., for the a¹ tuning-fork used by me to 26 seconds on the average.

superiority of air-conduction over bone-conduction for the vibrations of the deeper tuning-forks.

This is evident from the following reflection :

As above related, the tuning-fork a^1 after having ceased to be heard on the application of its handle to the base of the mastoid portion directly behind the auricle, will be heard thirty seconds longer by the normal ear when its prongs are held next to the meatal orifice.

Up to the present, it is not permitted to draw from this result the positive conclusion that the air-conduction really excels in duration the bone-conduction, since hereby, as already has been dwelt upon, the experimental arrangement is different for testing the bone- and air-conduction.

But when we now likewise measure the last remnants of air-conduction through the handle, since we place the handle quite in the same direction and with the same pressure into the ear canal as before on the mastoid portion, both time measurements become directly comparable with each other.

Also the distance of the end of the handle from the cochlea remains in both these latter experimental arrangements at least nearly the same.

Consequently the new experiment demonstrates not only a distinct predominance of the air-conduction over the bone-conduction, but it permits also to determine the superiority of the air-conduction for each individual tuning-fork in correct proportions.

For my a^1 tuning-fork this superiority amounts to $30 + 12$ seconds, as the above numbers show ; *i. e.*, after it has ceased to be heard on the mastoid portion, the vibrations of its prong ends are still heard 30 seconds longer before the ear, and the vibrations of its handle placed in the ear canal are audible still 12 seconds more.

But since, as above stated, the fork expires quicker by the pressure of the handle upon the walls of the ear canal than when the handle is held free, this superiority would, in truth, be still greater than $30 + 12$ seconds, if we could measure it in real air-conduction duration ; *i. e.*, if we were able to advance the prongs as near to the tympanic membrane as we are able to do with the end of the handle of the fork.

A CLINICAL AND HISTOLOGICAL CONTRIBUTION TO THE SARCOMATOUS TUMORS OF THE TEMPORAL BONE.

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SINCE the publication of a complete collection of sixty cases of sarcoma of the temporal bone by Dr. Asch (1) in Strassburg, Leutert (2) published a case of endothelioma lymphaticum, Schmeden (3) one of small alveolar sarcoma, Haug (4) an endothelial carcinoma, Nadoleczny (5) an endothelioma, Joel (6) a sarcoma, and Haug (7) an inoperable case of melanotic sarcoma of the temporal bone. The publications of Stowers's (8) and Roncali's (9) cases have not been accessible to me. The only other case of melanotic sarcoma besides Haug's was reported by Kuhn (10), and was also inoperable. The following case of a melanotic and that of an alveolar sarcoma, in which operative interference was permitted at an early stage, furnished the opportunity of studying the destructive progress of the neoplasms.

CASE I.—Alveolar endothelioma of the temporal bone.
The family of a three-year-old boy is free from constitutional affections. The boy has been without ailment until four weeks previous to his admission. Since that time he has had pain in the region of right ear and neck, which compels him to hold his head in an oblique position. For the last two weeks he has had a discharge from the right ear, with pain and swelling of mastoid region. A paracentesis of the drum gave no relief, and when admitted to hospital the boy had no fever and appeared in good general

condition. Now the right auricle is pushed forward, the skin over the os planum red, glistening, swollen, and painful. Fluctuation present, and fluid pus in the depth of the slit-like, narrowed auditory meatus. Drum-head not visible; functional examination not practicable. The diagnosis of acute middle-ear and mastoid inflammation with subperiosteal abscess seemed assured. When operated upon, the skin incision disclosed at once a grayish-red, nodular round tumor, 1.5 *cm* in diameter, which had perforated the bone. It was adherent and protruded through the bone for 0.5 *cm*. This mass extended into the middle ear and, forming a perfect cast of the mastoid antrum and process, destroyed its septa and most of the posterior wall of the osseous meatus. The complete removal of the mass exposed the facial nerve for 0.5 *cm*. The nerve when touched produced some contractions of the corresponding side of the face. In the region of the destroyed upper posterior wall of the antrum the tumor was adherent to the dura, which seemed macroscopically intact but hard and thickened. An exploratory incision into the dura and into the sinus showed, with exception of condensation, nothing abnormal. The bony shell of the tumor was removed everywhere up to the point where the bone seemed healthy. This point could not be reached at the floor of the middle ear. The mastoid tip was resected and the membranous ear canal slit in the centre and tamponed against the upper and lower exposed surface. The temperature reached 38° the following day, remained normal for two days, reached 40° on the fourth day, and receded after opening of an abscess in the sterno-cleido-mastoid muscle to 38.5°, where it remained without great fluctuations. The patient gradually lost ground without sign of local recurrence, metastasis, or pyæmia. The appearance and healing of the operation wound were very satisfactory. The patient withdrew from personal observation for the subsequent eleven weeks, during which the temperature of 38.5° continued and often reached 40° in the evening with a cough and expectoration. When again examined the patient had a dirty yellow skin and eczema of the head and back. The region of the operation was entirely epidermatized excepting a small granulating surface near the floor of the middle ear. No local recurrence or facial paralysis or enlarged neighboring glands were noticed. A flat, oval, painful, immovable tumor, 5 x 3 *cm* in diameter, centrally fluctuating, hard and resistant in the periphery, covered with thin, inflamed, tense, and shining epidermis occupied the right frontal

eminence. A tumor of similar character, of half-egg size and shape, involved the fourth rib in the anterior axillary line. Dulness on percussion and lessened vesicular breathing existed in a radius of 2 *cm* around the immovable tumor, which restricted respiration and the thoracic movement. A deep-seated, immovable, hard swelling existed at the junction of the middle and upper thirds of the forearm. Death six weeks after last examination.

Autopsy.—A pale red, centrally purulent tumor, 5 x 2 *cm* in diameter, involving and destroying the right fourth rib and part of sternum, extends for 4 *cm* into the lung tissue, obliterating the pleura. The tumor over the frontal eminence, noted in the above history, contains a teaspoonful of thick pus under pressure. A sharp, rough-edged, perfectly round defect, 35 *cm* in diameter, is situated 4 *cm* above the incisura supraorbitalis, exposing the strongly adherent dura mater, which is covered by its mass. The inner surface of the dura shows only vascular injection without infiltration and is, except at this location, normal and easily detached. The dura, brain, and vessels show no notable alterations. The right temporal bone, portions of the frontal and thoracic metastatic tumors, as well as of the heart, kidney, liver, and spleen, were removed for microscopic examination and put in a 10% solution of formol. The temporal bone was decalcified at the end of two weeks in a 40% solution of formol 10.0 cc, pure nitric acid 10 cc, water 80.0 cc, which had been renewed several times. Then it was embedded in celloidin and cut into sections vertically to the long axis of the petrous bone.

Microscopic examination.—1. Sections of the lobulated tumor removed during the operation show under moderate amplification cavities filled with fresh red blood corpuscles. Strands of varying thickness of very fine, highly stained connective-tissue fibres (Van Gieson's stain) enclosing blood-vessels, unite and form meshes which contain aggregations of light brown cells. This prevailing organoid type is often rendered indistinct by the faintness of the stain or cell-aggregation and freshly extravasated blood or by acute inflammatory processes within the tumor productive of round-cell infiltration with molecular degeneration. The surface of the tumor is made up of flattened tumor cells. The portion removed from the middle ear shows a covering of normal tympanic membrane as described by Kessel (11). In

the tumor mass are found many bony trabeculæ derived from the ossicles or mastoid cells with lacunar arrosion, and in the process of resorption.

When examined under high power, large masses of cells are seen adjacent to the well-developed framework, which surrounds the blood-vessels. Their endothelium consists of several layers of pale brown cells protruding into the lumen, which is surrounded by a distinct mantle of very small bright red nucleated cells. From these cells a network of highly colored fibrillæ project and form, with the well-stained fibrillæ of the connective-tissue cells, the fine framework of the tumor. The nuclei of these cells are sparse, thin, and fusiform. The slitlike spaces between the fibrillæ must be regarded as lymph passages, which contain cells of various sizes with bright molecular protoplasm and a small dark or large light brown nucleus and nucleolus. Their relation to the fibrous wall is either parietal or they are arranged in rows on either side. From the proliferating endothelium of the lymph passages the fibrillæ project everywhere into the masses of large cells, which they enclose singly or in numbers. The cells are large, polymorphous, and edgewise compressed, with an oval or kidney-shaped nucleus and dark nucleolus. Mitoses and giant cells are rare. They frequently bear a close resemblance to cubic epithelium. These cell-masses are identical with and derived from the endothelium of the lymph passages. The lumen of the blood-vessels is in many places obliterated by proliferating endothelium, or a thick proliferating mantle of endothelium extends outward like those seen in angiosarcoma.

The neoplasm is composed principally of the endothelium of lymph-vessels, of connective tissue, and in a moderate degree of blood-vessel endothelium. The alveolar structure is characteristic in the specimens of recent growth. The present writer prefers to call this kind of a tumor an alveolar endothelioma in preference to the usual appellation of alveolar sarcoma, large round-cell sarcoma, or endothelioma lymphaticum.

2. Sections of the petrous bone obtained from the body at the autopsy, 5 months after the operation.

The wound of operation has cicatrized except below the promontory where the masses of young connective-tissue cells cannot with certainty be differentiated from sarcomatous cells. Within the cicatricial tissue a few strands of curled striated, strongly refracting, unstained cotton-fibres are enclosed by large giant cells. The facial nerve is preserved intact; the stapedius muscle and tensor tympani are atrophic and degenerated.

On the exposed surfaces no recurrence took place and it is therefore of interest to note the intense progress of the neoplasm within the petrous portion, which left only the hardest parts of the bone, the lamina vitrea, the labyrinth capsule, the facial and carotid canals, free from invasion.

The progress of the tumor extends to the tip of the pyramid and fills all the free spaces of the diploic bone. The invasion of the walls by the tumor elements of the lymph passages causes their gradual breaking down and the formation of lacunæ without giant cells. The connective tissue of the Eustachian tube is infiltrated down to the isthmus. The lateral sinus, jugular vein, and dura are normal.

3. Microscopic examinations of the metastatic tumors show their sarcomatous nature. The lacunar destruction of the bone and the proliferation of the tumor into the lacunar spaces is here equally evident. In the attached lung the disease progresses along the interalveolar tissue and leads to compression of the alveoli and bronchi. The pleura is, at the point where the tumor is adherent, not discernible. The other organs removed are normal. The early and simultaneous appearance of metastatic tumors on the forearm, forehead, rib, and lung appears to the author to be caused by dissemination through the vascular system during the operation of an infected embolus, primarily into the lung and from there to the forehead and forearm. In this particular this case differs from Kuhn's (10), in which metastatic tumors occurred a considerable time after the operation, and indicated a general malignant infection. The point of origin of the tumor is difficult to determine with certainty. He believes with Schwartz (12) that this variety of tumor starts from the dura. The course and progress of the neo-

plasm, and the fact that the most recent formation was found in the tympanum, point to this origin. The local non-recurrence indicates the superficial layer of the dura as the starting-place. To this view of Schwartze, the histologically analogous case of Leutert (2), which started from the floor of the tympanum, forms a notable exception. Considering the rapid progress and destruction in the direction of least resistance, the author believes the prognosis in childhood, where diploic bone is predominant, to be necessarily bad, and the progress of the disease farther advanced than can be macroscopically determined. In the adult the conditions are more favorable, and two authenticated cases have been cured. The occurrence of metastases has caused Schwartze to express his disapproval of operating on any malignant disease of the ear as hastening the fatal issue. The perfected operative technique of to-day somewhat lessens the importance of this opinion, though the above case seems to support it.

CASE 2.—Melanotic sarcoma of the right ear in a female patient forty-four years old of good previous history. Deafness existed for six months, purulent discharge for two weeks, following an attack of earache, which still continues. Right facial paralysis four days. For some time past a bloody discharge from nose. General condition upon admission good, pale complexion with numerous pigmented nævi-chronic pharyngitis, right choana narrowed by swollen mucous membrane. Fœtid discharge from right ear, which contains a grayish-red polypus. Pain on pressure over mastoid, no swelling. Left drum dull with shortened right reflex. Weber R > L. Rinne R —, L +. Bone condition not shortened. Whispering R before ear, L 13.5 m. On account of these conditions the operation of the radical opening of the middle-ear cavities is performed after removal of the aural polypus. Thickened periosteum and discolored thin cortex cover the large cavity of antrum and cells, which contain decaying, blackish granulation tissue. Their color, their penetration into the entire cancellous substance, and the presence of bone within the granulations justified the diagnosis of a malignant growth. Hard masses, occupying the tympanum and attic and enclosing the ossicles, are removed. The destruction of the roof of the tympanum and

antrum exposes the dura, which is discolored, covered with blackish masses, and perforated. The facial nerve is exposed for some distance, and when touched is without action on the facial muscles. The posterior part of the membranous canal is split and tamponed upward and downward in the usual manner.

With the prompt subsidence of pain the general condition of the patient improved and the wound completely cicatrized in ten weeks. When examined six weeks after the operation a grayish, movable, easily bleeding tumor with blackish spots is observed occluding the right side of the nose. In the post-nasal space the lobulated black tumor occupies the entire right choana, the mouth of the tube, and one third of the pharyngeal wall to the level of the floor of the nose. Two weeks later the tumor extends across the left choana, the pharyngeal wall is pushed forward to the mouth of the left tube, and a new deposit is observed on the left side of the naso-pharynx. A piece of the tumor is removed for examination; its entire removal under these circumstances is not contemplated. Two months and a half after the operation facial erysipelas appeared, from which she recovered, but the tumor did not change.

Microscopic examination of the hardened and decalcified mass shows the ossicles contained in the section and well preserved, with some remains of the drum membrane. The surrounding tumor masses contain bony particles and pigment in all stages of development. Fresh blood is seen between the nodules of the tumor which, in the vicinity of the processus brevis, shows an alveolar structure and an epidermal coat of varying thickness and containing epithelial pearls. The lymphatic passages of the underlying neoplasm contain rows of strongly pigmented cells without visible nuclei. The cells are frequently arranged in radiating order around the cross-section of the blood-vessels. The alveolar structure becomes apparent in the deeper tissue, where the vessels are surrounded by large spindle cells with dark oval nuclei, and fine long processes forming a reticulum for compact masses of well-developed, often pigmented, cells. The numerous blood-vessels, with their endothelium, are easily recognizable. The pigment gives no iron reaction. The tumor mass of the mastoid and antrum shows the alveolar structure only under high power. **Diagnosis.**—*Melano-sar-*

coma. The tumor progressed by proliferation into the cavities lined with mucous membrane or periosteum. The cell invasion of the lymph passages of the lining membrane leads later to destruction of the bone. This and the greater resistance of the canaliculi explain the preservation of the ossicles. The sheath of the chorda tympani is perforated by the neoplasm, and half of the nerve fibres are destroyed by pigmented tumor cells. The aural polypus is covered by mucous membrane, and is of a sarcomatous nature without alveolar structure, but with beginning pigmentation. The nasal and post-nasal tumors are also of the melano-sarcomatous type, with free vascular supply and pigmentation, but without distinct alveoli.

The origin of this tumor cannot well be surmised. In view of the prevailing opinion that melanotic tumors grow only where pigment exists, it is difficult to account for it in this normally unpigmented region. Haug observed a case from its incipency in which the ear canal, its starting-point, was free from pigmentation. The author admits, in his patient, the possibility of a nævus near the drum-head, but finds just in this region the youngest formation of the tumor and the least pigment. It is also of interest to note that the tumor in this instance did not progress in the direction of least resistance, but into the restricted space of the tympanum and tube. The nasal tumor could not have been diagnosed when the destruction in the ear had so far progressed. Haug consequently considers the ear tumor as unlikely to be a metastasis from the growth. In no case of Kümmel's (13) collection of eight cases of melano-sarcoma of the nose, nor in Schallcross's (14) case, has metastasis to the ear been observed. These cases derive their pigmentation from the olfactory mucous membrane. Some time previous the patient ligated a dark wart on the forehead with a thread. It is impossible to decide whether this could have given rise to migration of tumor cells.

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REPORT OF THREE CASES OF LIGATION OF THE INTERNAL JUGULAR FOR SEPTIC THROMBOSIS, FOLLOWING PURULENT OTI- TIS MEDIA—RECOVERY.

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IN any case of general septic infection, it is the aim of the surgeon either to remove the focus causing this systemic condition, at as early a date as possible, or, if its removal is impossible, to isolate it completely from the general circulation. A septic thrombus of the lateral sinus, following inflammation of the middle ear, not infrequently extends downward into the internal jugular. As the clot becomes disintegrated, the characteristic symptoms of a septicæmia present themselves. While a certain number of these cases have recovered without operative interference, the majority terminate fatally, unless the condition is relieved by the surgeon. Ballance was the first operator to formulate a plan of procedure for the relief of the condition under discussion. Since the report of his cases, some fifteen years ago, the means of recognizing the condition have become more exact, while the operative technique has gradually been perfected.

In this paper, I desire to give briefly the history of three cases, in which early intervention undoubtedly saved the life of the patients.

The **FIRST CASE** was that of a young woman, who had suffered from a chronic suppurative otitis since childhood. On removing

the carious ossicles and curetting the tympanum, a dehiscence was found in the floor of the tympanic cavity. Although the curette was used with extreme care, the jugular bulb was entered. About four days after the removal of the ossicles, the patient began to develop symptoms of general sepsis. In addition to the constitutional symptoms, there was well-marked tenderness just below and in front of the mastoid process. An immediate operation was performed. The internal jugular was exposed from a point just below the omo-hyoid muscle, to the jugular bulb. On examination, a thrombus was found in the vein, at a point about a quarter of an inch below the base of the skull. The walls of the vein were inflamed and thickened for a considerable distance. The vessel was secured between two ligatures, just below the omo-hyoid, and all tributary vessels were tied off in the same manner and divided. Two ligatures were then passed about the vein, at the upper angle of the wound, as close to the base of the skull as possible. The entire portion of the vein involved was then carefully dissected out. The temperature at once fell, and the patient made an uninterrupted recovery. At the time of the operation, both sinus and jugular bulb were thoroughly explored, and found to be in normal condition. It was evident, therefore, that septic infection did not occur as the result of puncture of the bulb itself, but rather from denuding a large surface within the tympanum, giving free access to infectious material.

The SECOND CASE was that of a man, about thirty years of age, who had been suffering from an acute purulent inflammation of the middle ear for about eight weeks. When I first saw him, there were marked signs of inflammation of the mastoid process. The typical mastoid operation was done, and on removing the carious bone the sigmoid sinus was exposed. As the walls of the sinus seemed thickened, the vessel was opened, and a small clot was removed. The patient did well for about a week, at the end of which time symptoms of profound sepsis appeared. In this case, the jugular was exposed from a point just above the clavicle, to the base of the skull. Both the vein and its tributaries were filled with a clot in a state of decomposition. The technique of the operation was carried out precisely as in the former case, and the patient made a complete recovery.

The THIRD CASE was that of a young man who came to the Hospital with a history of acute inflammation of the middle ear, followed by characteristic symptoms of mastoid involvement. The

mastoid was immediately operated upon, and the internal table of the skull, covering the sinus, was found to be involved. The external wall of the sinus was extremely thick, and upon incision no bleeding occurred. By means of the curette, a firm clot was removed from the lumen of the vessel. The curette was carried first upward toward the torcular, and then downward toward the bulb, until fairly free hemorrhage followed. Owing to the fact that the case only came under observation on the day of the operation, I determined to postpone further operative interference until more exact observation could be made of the temperature record. About thirty-six hours after the first operation, characteristic symptoms of systemic infection made their appearance. Upon exposing the internal jugular, the vessel and its tributaries were found to be entirely filled with a soft clot. The disintegration of the walls of the vessel had been so extensive that the vein could only be secured by pulling it forcibly upward from beneath the clavicle. After passing two ligatures about the vein as low down in the neck as possible, it was divided between them. The tributary vessels were so much involved that it was impossible to ligate them alone. The only way that they could be secured was to include a small amount of muscle or fascia within the ligature. Very free hæmorrhage occurred in this case, and it was absolutely impossible to dissect out the vein. Every tributary was carefully sought for and ligated. Several large lymphatic glands were removed. Two ligatures were then passed about the vein, close to the base of the skull, and the vessel divided between them. As the septic focus was thus practically isolated, and as it was impossible to remove the vessel completely, I deemed it perfectly safe to pack the wound firmly with iodoform gauze, feeling sure that no further infection could occur. This patient recovered perfectly, and was discharged from the Hospital about three weeks after the operation.

While it is always wise to remove the vein, if this can be done, the last case proves conclusively that, in those instances where the walls of the vessel have become so much involved as to prevent this procedure, a careful isolation of the septic area will prevent further systemic infection.

REPORT ON THE PROGRESS IN OTOLOGY FOR
THE SECOND QUARTER OF
THE YEAR 1900.

By DR. A. HARTMANN.

Translated by Dr. ARNOLD KNAPP.

ANATOMY AND PHYSIOLOGY OF THE EAR.

114. KIESOW and NADOLECZNY. The psycho-physiology of the chorda tympani. *Zeitschr. f. Psychologie und Physiologie der Sinnesorgane*, vol. xxiii.

115. SCHWENDT. Observations on the upper limit of human hearing. *Arch. f. Ohrenhkl.*, vol. xlix., p. 1.

116. KÖNIG. The static functions of the labyrinth. *Arch. internat. de laryng., d'otol.*, vol. xiii., No. 2.

114. These authors examined the sense of taste in two cases of chronic purulent otitis which had been operated upon by stimulating the chorda tympani nerve mechanically and with the constant electric current, and also testing the taste on the tongue. The experiments confirm the view that the taste fibres for the anterior two-thirds of the tongue are supplied by the chorda tympani, and that after destruction of the chorda the taste faculty is lost on the corresponding position anterior to the follicular area. On touching the chorda pain was experienced in the molar teeth and in the tongue (trigeminal reflex). BRÜHL.

115. SCHWENDT examined several normal hearing persons with the improved Edelman's Galton whistle to determine the upper tone-limit. He found that a tone an octave higher could be perceived than with König's rods or tuning-forks. A man, aged sixty-nine, could hear d⁸ (37,000 v. d.), several younger persons attained fis⁸ (48,000 v. d.) and even higher. The upper limit for young people is between c⁸ and fis⁸. Schwendt proposes to

designate tones above c° produced by the organ and piccolo as ultramusical. Compact bodies do not produce a higher tone perceivable by man than f' . Edelmann can now produce a tone of 170,000 v. d., or almost f'' , demonstrable with Kundt's dust figures. BLOCH.

116. KÖNIG reviews the experiments and opinions of previous authors. He experimented with doves and found that the effects of Flourens's test (section of semicircular canals) could be obtained when the membranous semicircular canals are exposed and anæsthetized with cocaine. Hence Flourens's symptoms are due to a loss of function of the semicircular canals and not signs of irritation. SCHWENDT.

GENERAL.

a.—REPORTS AND GENERAL COMMUNICATIONS.

117. GRUNERT and ZERONI. Annual report of the Halle Ear Clinic for 1898-99 and 1899-1900. *Arch. f. Ohrenhkl.*, vol. xlix., pp. 97-237.

118. TOMKA. The relation of the facial nerve to diseases of the ear. *Arch. f. Ohrenhkl.*, vol. xlix., p. 24.

119. BEZOLD. Ear oils and other ear drops on public sale. A contribution to the crusade against quackery. *Aerztl. Ver-einsbl.*, No. 422, 1900.

117. The reports contain the usual notices on the work done at the Halle Clinic with its steadily increasing numbers. A large number of case histories with remarks and occasional autopsies are added. BLOCH.

118. A very instructive, carefully prepared, and readable monograph on this subject. After a description of the anatomical relations of the facial nerve the etiology is discussed, taking cold, diseases of the external ear (zoster, cerumen, otitis ext.), in which the facial paralysis is supposed to occur reflexly. The acute catarrhs and inflammations of the middle ear, the chronic suppurations including the tuberculous, and the accompanying carious destructive processes in the temporal bone are next treated with due consideration of the literature. Further causes mentioned are trauma, direct injury to the Fallopian canal or following suppurative diseases, fractures of base, operations, etc., new growths in the canal, polypi, sarcomata, carcinomata, cholesteatomata, exostoses, and others; finally tumors at certain parts of the base of the

skull. Endocranial complications may also cause paralysis. The facial nucleus may be affected and contralateral paralyses arise, or the trunk on one side may be invaded. The succession of paralyses may determine the site of disease as of an abscess. Slow and late appearing facial paralysis indicates a tuberculous process. The paralysis has been observed in sinus thrombosis. The anatomical changes are inflammatory or atrophic — degenerative in nature. The nerve is quite resisting; extension per Fallopian canal to the cranial cavity has been observed without paralysis. The nerve, as is well known, is very susceptible of regeneration.

Pains about the ear and side of face, tinnitus, and disturbance of taste may appear prodromally. Besides the generally known signs of the paralysis and salivation, disturbances of smell are mentioned. Tinnitus and deafness without evident changes in the ear may be due to a simultaneous labyrinthine hyperæmia. If the palate is also paralyzed, the incomplete ventilation of the Eustachian tube and its results may be present.

If the paralysis disappears, the various groups of muscles resume their activity at different times. Paralyses in childhood may influence the bony development on the corresponding side.

The diagnosis is usually easy: the reaction of degeneration is usually present only in peripheric paralyses; combined with one-sided deafness suggests a tumor in the internal auditory meatus.

The prognosis is generally more favorable in children than in adults, in acute than in the chronic, such as tuberculous, syphilitic, cachectic. A favorable sign is the continuation of the normal reaction of the nerves to electric stimulation or its return; unfavorable is the absence of electric reaction, muscular atrophy, sudden total paralysis, loss of sweating on the same side.

Treatment in the acute and chronic forms depends on the locality of the morbid process and not on the paralysis itself. Galvanic treatment is of slight avail.

BLOCH.

119. BEZOLD speaks of the prominence given to the ear oils in the home treatment of ear diseases. Most of Bezold's cases of otomycosis had instilled oil in the ear a short time before the development of the fungus. In 29 of 48 cases inflammatory conditions were present. The mycelium enjoys a much more exuberant growth in the presence of oil. Finally attention is drawn to danger of instillations and syringing in ruptures of the membrana tympani and fractures of the base.

HARTMANN.

b.—GENERAL SYMPTOMATOLOGY AND PATHOLOGY.

120. EITELBERG. What relation has agorophobia to certain diseases of the auditory organ? *Wiener med. Presse*, No. 28, 1900.

121. BOULAI. Hemorrhages of the drum membrane, middle turbinate, and soft palate at the menopause. *Arch. internat. de laryng.*, etc., vol. xiii., No. 2.

122. BOULAI. Voluntary contraction of the muscles of the tympanic membrane. *Arch. internat. de laryng.*, etc., vol. xiii., No. 2.

123. ROHRER. On the connection of neuralgic diseases of the ear, otalgia nervosa, with diseases of the teeth, the mouth, and naso-pharynx. *Schweizerische Vierteljahresschr. f. Zahnheilk.*, vol. x., No. 2.

124. PETYT, R. Pin introduced into the ear passed per anum. *Brit. Med. Jour.*, June 30, 1900.

120. The relation is a very loose one. In a case of EITELBERG's agorophobia appeared after excessive administration of thyroid tablets given for weeks in chronic aural catarrh. Treatment was psychic. POLLAK.

121. In a woman of forty-two, at the menopause, blood vessels appeared on the turbinates, drum membrane, and soft palate. This appearance recurred regularly and was accompanied by neuralgic and general headache. The nervous condition grew worse and the patient had to be put in an asylum.

SCHWENDT.

122. BOULAI observed two cases where a distinctly audible, crackling noise occurred 130 times a minute. In one of the cases the drum showed a simultaneous vibration. The noise could be produced at will. The author considers it to be due to contraction of the tensor tympani.

SCHWENDT.

123. ROHRER discusses the causes of otalgia nervosa and the nerve channels by which this is produced. He mentions that the pain may also be localized in the mastoid process. Two case histories are reported.

HARTMANN.

124. A man aged twenty-two years had suffered from otorrhœa and deafness for many years. A few days before coming under observation, a pin, which he had introduced into the right meatus to clear the passage, slipped inside altogether. While PETYT was proceeding to make an examination, the patient exclaimed suddenly that "he felt it in his throat." Examination for the pin in

the ear and throat was negative. Two days later pain in the stomach was felt. The next day, when he was about to have a motion of the bowels, he felt a slight prickling sensation. On examining the stool the pin was found. CHEATLE.

C.—METHODS OF EXAMINATION AND TREATMENT.

125. BEZOLD and EDELMANN. A new method to determine the quantity of hearing with tuning-forks (method of Schmiegelow). *Arch. f. Ohrenhlk.*, vol. xlix., p. 3.

126. BEZOLD. Results of functional examination with the continuous-tone series, especially in deaf-mutes. *Münch. med. Wochenschr.*, Nos. 19 and 20, 1900.

127. NEUBAUER. A watch (otometer) to examine the hearing. *Pejgydszat*, June 3, 1900.

128. MIGNON. Nirvanine in the nose, ear, and throat. *Arch. internat. de laryng.*, vol. xiii., No. 2.

129. JAENICKE. Some new nasal instruments. *Deutsche med. Wochenschr.*, No. 25, 1900.

130. DENCH, E. B. The importance of a careful functional examination in chronic inflammation of the middle ear. *N. Y. Eye and Ear Inf. Repts.*, January, 1900.

131. GRAY, ALBERT A. The production of local anæsthesia in the ears. *Lancet*, April 21, 1900.

132. GLEASON, E. B. Uses of silver salts. *Laryngoscope*, March, 1900.

133. GOLDSTEIN, M. A. What not to do in ear, nose, and throat disease. *St. Louis Med. Review*, June 2, 1900.

125. BEZOLD and EDELMANN in their critical review of Schmiegelow's paper (*Arch. f. Ohrenhlk.*, vol. xlv., p. 164) claim that in experiments with larger tuning-forks it is incorrect to take amplitude in the square of the distance from the ear as is usually done. The vibrating surface of the blades of the fork are several times greater than the diameter of the meatus. This law holds good only when the sound emanates from one point. Tuning-forks are unsuited to measure hearing distance, as is well known. According to Vierordt, amplitude decreases in simple ratio to the distance from the source of sound in the open air. BLOCH.

126. BEZOLD reviews briefly the results of the functional examination of hearing with the continuous-tone series, from the standpoint of physiology and pathology, especially in the case of

deaf-mutes. The hearing and singing instruction of eleven partly hearing deaf-mutes was described by Keller, and Edelmann demonstrated the highest number of vibrations in the Galton whistle with the Kundt dust figures. SCHEIBE.

127. NEUBAUER describes a cylindrical clock with stop arrangement which had been devised by Bing many years ago. POLLAK.

128. Nirvanine is less toxic than cocaine, and is especially useful for infiltration anæsthesia. It can be employed with advantage in the neurasthenic and in those with weak heart. SCHWENDT.

130. In order to make a functional examination of the ear at all reliable, DENCH believes that each instrument used should be accurately tested. Several methods are given in detail to aid one in making an exact estimate of the actual rate of vibration (Schwingungszahl) of tuning-forks. To determine defects in the lower scale, forks from 16 to 100 double vibrations are suggested. In order to exclude disease of the conducting apparatus, the lower tone-limit must be determined. A fork of 256 (c¹) double vibrations is preferred for the bone determination. All forks must be free from overtones. The Galton whistle is used to examine the upper tone-limit. It is fairly accurate as far as 35,000 vibrations per second. CLEMENS.

131. GRAY finds that the following solution will produce anæsthesia of the healthy membrane; ten drops being allowed to remain in the meatus for from three to five minutes: Cocain. hydrochlor., five parts; rectified spirit, fifty parts; anilin oil, fifty parts. He has used it for incising the membrane for exudation in the middle ear with total absence of pain; and in curetting for granulations it has been successful. He sometimes uses, in certain cases, the following stronger solution: Cocain. hydrochlor., ten parts; absolute alcohol, thirty parts; anilin oil, pure, seventy parts. He thinks that water is abstracted from the tissues, so allowing the solution to pass through the deeper layers to the nerve termination. CHEATLE.

132. Four cases are reported where protargol was used, and from the prompt results following GLEASON is led to believe that it is an antiseptic astringent superior to any other in use. Unlike silver nitrate, it is unirritating to the pharyngeal wall, the atrium, and the external auditory canal. CLEMENS.

133. GOLDSTEIN refers in his paper to the abuse of the syringe

in removing foreign bodies, especially those of cereal character, from the external auditory canal. He thinks that the use of the syringe should be limited to the removal of cerumen. Instillation of thick, heavy oils for the relief of pain is condemned. On account of the danger of fluids finding their way into the Eustachian tubes, the use of the nasal douche is considered dangerous. The use of inflation in acute otitis media and acute coryza is denounced. Very high air pressure for the manipulation of the spray often produces irritation and causes damage instead of benefit. Cocaine should be used only for diagnostic purposes.

CLEMENS.

d.—DEAF-MUTISM.

134. GUTZMANN. Deaf-mutism. *Berliner Klinik*, No. 2.

135. SCHMIDTMANN. The first course for physicians at the Royal Deaf-Mute Institute in Berlin from May 14 to July 2, 1900. *Vierteljahrschrift für gerichtliche Medizin*, vol. xx., p. 177.

136. NEUERT. The faculty of hearing and lip-reading. *Med. pedagog. Monatsch. f. d. gesammte Sprechheilkunde*, tenth year, Nos. 1 and 2, 1900.

137. BROOKS, W. K. The inheritance of deafness. *Johns Hopkins Hospital Bulletin* No. 110, May, 1900.

138. MOFFAT, L. The development of hearing in the congenitally deaf. *Four. of Ophth., Otol., and Laryngol.*, Jan., 1900.

134. GUTZMANN describes the method by which a deaf-mute is taught to speak by use of the eye and the tactile sense. The method by the eye is the more important, though hearing remnants can be employed to develop the speaking powers.

BRÜHL.

135. It is inconceivable to what results statistics may be employed. NEUERT examined nineteen deaf-mutes, of whom four had had aural speaking exercises for one year, to study the relations of hearing to lip-reading. He concludes that the results favor the lip-reading. The results are, however, unreliable, as his premises are wrong. The time spent in speaking exercises by the ear, scarcely four hours a week, is in no proportion to the length of the instruction in lip-reading.

PASSOW.

137. BROOKS shows, from a study of the statistics of Professor Fay, of Boston, that deaf people are more likely to have deaf offspring than are hearing people, although they are more likely to have hearing than deaf children. Deaf persons are divided into

congenitally deaf and adventitiously deaf. The transmission is about 30 per cent. for the congenital group, and less than 5 per cent. for the other.

Further, it is shown that marriages between persons whose relatives have deaf children give nearly 40 per cent. of deaf offspring, while marriages among those whose relatives were not known to have deaf children give only $1\frac{1}{2}$ per cent. of deaf children. Deaf persons without deaf relatives may marry, therefore, with comparative safety. It appears that a hearing person with deaf relatives is as likely to transmit deafness as a deaf person, so the danger really lies in having deaf relatives. Neither deaf persons nor hearing persons with deaf relatives should marry, and they certainly should not marry persons with deaf relatives.

Transmission of deafness is greatest where the parties having deaf relatives marry their relatives. Where the marriages are consanguineous between persons with deaf relatives, the percentage of transmitted deafness is over 50. CLEMENS.

138. The principle underlying MOFFAT's method to develop the hearing in the congenitally deaf is to watch the mouth of the teacher and see that, when certain motions are made, vibrations follow which produce a sound, and these sounds constitute a word. As soon as the patient becomes familiar with the fact that *b* and *oy* mean *boy*, the sound is made in his ear, with or without a hearing-tube, and he is made to understand that the noise he now hears is the word he has lately learned; gradually one word after another is added to his vocabulary and one noise after another withdrawn.

In testing, it is difficult to ascertain how much hearing a child possesses, for he does not seem to know what to expect, nor what is expected of him. Moffat found in many instances that an observer could discover in the eyes of the child when the first sensation was felt or heard. He believes great good may be accomplished, and the deaf much benefited by careful teaching along the lines of *perception* (Wahrnehmung). CLEMENS.

EXTERNAL EAR.

139. MACASKIE, J. G. Removal of a foreign body from the ear. *Lancet*, June 2, 1900.

140. BELLOW, HOWARD P. Caries of the external ear-canal. *Homœopathic Jour. of Eye, Ear, and Throat*, April, 1900.

139. A boy pushed into the right meatus a piece of india-

rubber which had previously been attached to a lead-pencil. As it fitted the passage so exactly, ordinary means of extraction failed. A small piece of twine, with the end teased out and thoroughly coated with seccotine, was pushed tightly against the rubber and kept in position for twenty-four hours. At the end of that time the twine was removed with the rubber attached.

CHEATLE.

140. BELLOWS reports a series of unusual cases to demonstrate how carious diseases can extend from the attic or from the mastoid cells to the external ear-canal; or how caries may originate in the auditory canal independently, and how treacherous its development may be. The occurrence of caries of the posterior-superior wall, due to extension of caries of the malleus, or from middle-ear suppuration, is not touched upon.

The anterior wall appears singularly exempt from carious disease.

CLEMENS.

MIDDLE EAR.

a.—ACUTE OTITIS MEDIA.

141. VEILLARD. A study of middle-ear disease in new-born and sucklings.

142. STRAIGHT, HOWARD S. Otitis media. *Cleveland Four. of Med.*, May, 1900.

141. VEILLARD concludes from numerous operations and autopsies that in 100 new-born and sucklings dying in asylums, 35 to 40 suffer from middle-ear disease, where the diagnosis can only be made by the aural mirror, as there is no tendency to perforation of the drum-membrane.

BRÜHL.

142. STRAIGHT believes that it is impossible, in the beginning, to diagnose whether a given case will take the catarrhal or suppurative form of inflammation. He is not quite sure that a catarrhal case can become a suppurative one, but, if no meddlesome treatment be employed, a given class of cases are bound to result in resolution, just as sure as another class will result in suppuration in spite of all treatment. Rest in bed in any case is absolutely essential. A second means of treatment quite as important is the application of heat. Heat in no way aborts a threatened abscess, or prevents a catarrhal case from becoming suppurative, but it is an efficient means of controlling pain. Paracentesis is employed if these means prove of no avail in bringing relief.

Strict antiseptic precautions are observed. The Eustachian catheter is employed when discharge ceases. The use of inflation by Politzer's method is condemned in early stages of inflammation. At any time its therapeutic value is questioned. CLEMENS.

b.—CHRONIC OTITIS MEDIA.

143. PIERRE. Treatment of otorrhœa at the seashore. *Arch. internat. de laryng.*, etc., vol. xiii., No. 2.

144. SCHRÖDER. 130 ossiculectomies; a contribution to the treatment of chronic purulent otitis. *Arch. f. Ohrenhilk.*, vol. xlix., p. 17.

145. GOMPERTZ. The function of the ear canal after the radical operation. *Wien. med. Wochenschr.*, March 4, 1900.

146. FELT, CARL LEE. Iodine-bearing drugs in the treatment of chronic purulent otorrhœa. *N.Y. Med. Four.*, June 23, 1900.

147. RICHARDS, GEORGE L. The treatment of suppurative otitis media in young children. *Med. News*, May 19, 1900.

148. REIK, H. O. Some interesting cases of mastoiditis. *Maryland Med. Four.*, May, 1900.

149. LAKE, R. Complete ossiculectomy (removal of remains of drumhead, larger ossicles, and external attic wall) in chronic ot. med. supp., with analysis of fifty cases. *Lancet*, March 10, 1900.

143. The sojourn at the seashore has a favorable influence on scrofulous children with inveterate otorrhœa, as the nasopharyngitis is cured and the general condition improved. The local treatment must, however, be continued, combined with surgical intervention if necessary. Sea baths are only permissible exceptionally and with special precautions. SCHWENDT.

144. This is a report from Ludwig's clinic. Chronic otorrhœa was always the indication. About one half were cured. If the hammer was found carious, the anvil was also carious or destroyed, while with a carious anvil the hammer often showed no change. A marked improvement in hearing occasionally followed. The author thinks it his duty to draw renewed attention to this proceeding, especially as after the radical operation healing does not always take place. BLOCH.

145. To improve the hearing after the radical operation, GOMPERTZ uses a thick layer of insufflated boric powder to replace the drum. The author recommends the excision of the hammer

and division of the incudo-stapedial joint as a primary step in the operation and care in the introduction and holding of the Stacke's protector. POLLAK.

146. After considering the merits of the various iodine combinations, FELT finds that *iodomuth* for insufflation has given him the most satisfactory results in the treatment of chronic middle-ear suppuration. Iodomuth is a bismuth powder containing twenty-five per cent. of iodine; it is odorless, impalpable, reddish-brown, and does not cake in the ear. It contains sufficient iodine to stimulate the tissues and to destroy the micro-organisms. It deodorizes the discharge, and a local sedative action is derived from the bismuth. His observations extend over a period of nearly two years. CLEMENS.

147. The frequent occurrence of middle-ear suppuration in children is dwelt upon by RICHARDS, and in describing his method of handling such cases he confines himself in his paper entirely to the consideration of the local treatment.

In cases of long standing, with foul discharge and caries, he syringes the ear with warm sterile water, or a solution of bichloride of mercury 1:5000, until the parts are thoroughly clean. The canal is then dried and the ear inspected. Where there is much destruction of the tympanic membrane, hydrogen peroxide is applied on cotton pledgets, and, after drying, a solution of boric acid in 40 to 90 per cent. alcohol is applied in the same manner. Alcohol over 50 per cent. is seldom used in young children. The middle-ear surface is then dusted lightly with boracic acid, or some other similar drying powder, and the ear stopped with a small, narrow wick of iodoform gauze, care being taken that it reaches the bottom of the canal. In more acute cases, with a small perforation, thorough cleansing is employed, the use of boric acid, alcohol, hydrogen peroxide, and powders being omitted. The gauze wicking or cotton pledgets are inserted and changed frequently. Should the perforation be too small to ensure good drainage, a free incision at the posterior inferior quadrant is advised.

The successful continuance of the details of this treatment at the home of the patient, by the mother or attendant, is considered most essential. Elementary instruction is given in anatomy, manipulation, and technique to the person who attends the patient, in order to secure an intelligent application of the method.

CLEMENS.

148. Case 1.—Acute mastoiditis (Bezold variety) without perforation of the membrana tympani. Owing to a sclerosed external cortex of the mastoid, the inflammatory process broke down the cellular structure and internal wall of bone into the soft tissues of the neck. The tympanic membrane was never perforated, although active inflammation was prolonged in the tympanum. There was little fever at any time. Case recovered.

Case 2.—Fatal pyæmia from chr. supp. ot. med. Patient was a male, twenty-five years old, and had had discharging ears for past ten years, following an attack of scarlet fever. For a short time he had severe pain in the right ear extending over the temple and mastoid. No swelling or redness of mastoid integument at any time. After several severe chills and a temperature of 105.4° the mastoid was opened and only a few drops of pus were found in region of the sigmoid sinus. Upon opening the sinus a seemingly satisfactory flow from both ends occurred. Patient grew worse subsequently. Cranial cavity was explored with negative results. Death from septic pneumonia. Blood examination negative.

Case 3 was a male twenty years old. Discharge from right ear for last sixteen years. Pain and swelling over right mastoid for last four days; marked fluctuation. At the operation as soon as the knife divided the skin and periosteum fully 200 cc of pus was evacuated. Three months later a secondary operation was performed to close a fistulous opening over the antrum. On the external surface above, behind the antrum opening, there was a carious perforation 6 mm in diameter, covered with granulations. A thorough curetting released pus and cheesy material. Pus from the subdural abscess showed the presence of bacillus coli communis.

Cases 4 and 5 were simple, uncomplicated, acute mastoiditis. After a mastoidectomy each was healed in five days by the use of the blood-clot method. CLEMENS.

149. Of LAKE'S 50 cases of ossiculectomy for chronic suppuration, 42 were cured of discharge, and improvement in hearing was obtained in 21. The average duration of the disease was thirteen years. He advocates removal of the outer attic with the burr (Cheatle's), as an adjunct to the operation of ossiculectomy. The excellent results obtained are distinctly encouraging. A complete analysis is given. CHEATLE.

Obituary.

DR. LAURENCE TURNBULL died at his home in Philadelphia, Oct. 24, 1900. He was born in Scotland, Sept. 10, 1821, emigrated to America when seventeen years old, studied pharmacy, graduating in 1842. His thesis was on salicine, the active principle of salicylic acid, which he had discovered, while a student, in the plant *Populus tremuloides*. Later he made the discovery that bichlorate of sodium bleached colored oils and ointments. He then studied medicine, entering the office of Dr. John K. Mitchell, the father of Dr. S. Weir Mitchell. He graduated at Jefferson Medical College, 1845. He served in the Philadelphia Hospital as resident physician, became connected with other charitable and teaching medical institutions, and served in the civil war as volunteer surgeon. He made a special study of ear diseases, and was a physician of eye and ear diseases in the Howard Hospital from 1857 to 1887. In 1877 he was appointed aural surgeon to the Jefferson Medical College Hospital and superintendent of the ear clinic. He may be considered as the first ear specialist in America and acquired an international reputation. He wrote a goodly number of articles on the ear. In 1881 he published *A Clinical Manual on the Diseases of the Ear*, which went through two editions. His *Manual of Anæsthetic Agents and their Employment in the Treatment of Diseases* has had four editions. He was the first in this country to perform the operation of opening the mastoid. He was invariably kind to his numerous patients and received a hearty recognition from his brother physicians of whom we may mention only Samuel D. Gross and H. Agnew. H. K.

(From a necrology in the *Public Ledger*, Phila.)

ABRAHAM KUHN, Professor of Otology at the University of Strassburg, whose death we announced in our last issue, was born in the Palatinate (Bavaria) in 1838, studied in Munich, Würzburg,

Giessen, and Vienna. He graduated, 1865, in Strassburg. Thesis : "On the Tumors of the Larynx." During the Franco-German war in 1870 he served on the French side under the International Red Cross. In 1873 he passed his examination as lecturer at the new (German) university of Strassburg and, admitted as Privatdo-cent of Otology, started a dispensary for ear patients, which in 1881 was extended and admitted to the university institutions with him as official [salaried] professor. In 1896 a large and appropriately equipped building was added as "University Ear Clinic" to the young and flourishing high school of learning.

Our readers are not unfamiliar with the work of Professor Kuhn's clinic ; several very instructive annual reports and a number of scientific articles from his clinic have appeared in these ARCHIVES, by his assistants, Dr. Manasse and others. He distinguished himself by thorough investigations on the inner ear of different species of animals, and was the author of the exhaustive article on the "Comparative Anatomy of the Auditory Organ of Avertebrates and Vertebrates," in Schwartz's *Handbuch der Ohrenheilkunde*. His excellent clinical and anatomo-pathological papers on Cholesteatoma are well known, and his article on "Neoplasms of the Ear" in Schwartz's *Handbuch* is appreciated.

Though an eminent and enthusiastic specialist, he did not neglect his rather extended general practice, and taught his special pupils not to lose touch with general medicine, and preferred as assistants such as were not likely to fall into narrow specialism.

H. K.

(From a necrology by his pupil, Prof. O. KÖRNER.)

BOOK NOTICES.

X. Atlas der Anatomie der Stirnhöhle, der vorderen Siebbeinzellen und des Ductus nasofrontalis mit erläuterndem Text und Bemerkungen über die Behandlung der Stirnhöhleneiterung. (Atlas of the Anatomy of the Frontal Sinus, Anterior Ethmoid Cells, and Naso-Frontal Duct, with Text and Remarks on the Treatment of Frontal Empyæmas.) By Dr. ARTHUR HARTMANN, Berlin. Published by J. F. Bergmann, Wiesbaden, 1900. Mk. 16 (\$4).

This atlas consists of twelve plates with twenty-four pictures of frontal and transverse head sections showing the relations of the frontal sinus and especially of its inferior part or outlet. The pictures are heliograph reproductions of specimens from the author's well-known collection. They are beautifully done and show the very high position which technical art in Munich has attained. In the text the important features and peculiarities of the specimens are described according to the author's subdivision into the following varieties :

1. Frontal sinuses without frontal cells and without a naso-frontal canal.
 - a. With simple opening through a round aperture or by a fissure into the middle meatus.
 - b. With an outlet into the nose in presence of an unusually developed bulla ethmoidalis.
2. Frontal sinuses with frontal cells which surround a naso-frontal canal.
 - a. With regular order of cells.
 - b. With irregular order of cells.
3. Hernial development of the frontal sinus.
4. Absence of frontal sinus.

A specimen is added to show the method of operating for frontal empyæma and establishing free communication with the nose.

The subject of treatment is fully discussed. A plea is made for the more extended use of intranasal methods, leaving the external operation always associated with more or less disfigurement for those cases which cannot be cured intranasally. If the communication with the frontal sinus be free, and inflation and irrigation have not relieved the discharge and frontal headache, the sinus should be opened externally. The simple opening of the frontal sinus is made on its anterior surface; the author prefers a horizontal incision along the eyebrow, extending slightly beyond the middle line. If a free communication into the nose cannot be made by this exposure, the frontal cells should be exposed from the orbital surface by making a vertical incision downward from the previous incision to the inner canthal ligament. The anterior ethmoidal cells are thus made accessible. The obliteration of the frontal sinus by the complete removal of the anterior wall in deep frontal sinuses is combined with so much deformity that the author considers it only justifiable in cases where cure cannot otherwise be obtained.

A. K.

XI. Diseases of the Throat, Nose, and Ear. A clinical manual for students and practitioners. By P. McBRIDE, M.D., F.R.C.P. Ed., Surgeon to the Ear and Throat Department of the Royal Infirmary, and Lecturer on Diseases of the Throat and Ear in the University of Edinburgh. Edinburgh and London: Young J. Pentland; Philadelphia: P. Blackiston, Son, & Co., 1900. Printed in Scotland. Price, \$7 net.

The author says in this third edition: "The book has been carefully revised, and in parts rewritten, so that I think it will be found up to date in all essentials." The reviewer takes pleasure in adding that the book is most carefully prepared and unusually well written. The selection and presentation of the subject-matter have been made with due consciousness of the responsibility as to the reader's need and time; in other words, the author has aimed at presenting, in the shortest space and clearest language, everything that the scientifically educated specialist in throat, nose, and ear diseases ought to be familiar with. There are a goodly number of illustrations, all in color, all original, and all good, particularly those on affections of the larynx. An extensive index of subjects and authors (twenty-eight pages) contributes a great deal to the general usefulness of the work as a book of reference.

The typography is superb, yet the price—\$7 for a text-book of

700 pages—seems too high. Paper less heavy and less glazed, and print less leaded, would have made a handier and lighter book, less fatiguing to the overtaxed eyes of the majority of the physicians of the present day. H. K.

MISCELLANEOUS NOTES.

In November, 1900, a **Section on Otology at the New York Academy of Medicine** was inaugurated and organized. A number of members of the Academy, taking special interest in otology, had submitted to the council of the Academy a petition to establish such a section under the same rules as the other sections. The petition was granted, and the section constituted itself by electing the following officers: Dr. JAS. F. MCKERNON, president, and Dr. ROBT. C. MYLES, secretary, and determined that regular meetings should be held on the second Wednesday of each month from October to May inclusive, at 8 P.M., in the Academy building.

The first meeting was held December 12, 1900. It was opened by the president of the Academy, Dr. WM. H. THOMSON, with an address on "The Importance of a Knowledge of Ear Diseases to the General Practitioner," which was followed by a paper on "Non-Operative Cases of Acute Inflammation of the Mastoid Cells," by Dr. Gorham Bacon. After the discussion of the paper the Section went into executive session, in which the preparation and publication of the transactions of the Section were discussed. It was determined that the reports should be prepared by an able stenographer and submitted, type-written, to each speaker before being sent to the publishing committee, the latter to consist of the editor of the journal chosen for the publication, the secretary, and a member of the Section appointed by the President.

The ARCHIVES OF OTOTOLOGY was chosen as the journal in which the transactions should be published.

The **New York Eye and Ear Infirmary** has received a gift of \$75,000 for the construction of a pavilion for its **Ear Department**. The donor is WILLIAM C. SCHERMERHORN, second vice-president of the Infirmary.

INDEX OF AUTHORS AND SUBJECTS.

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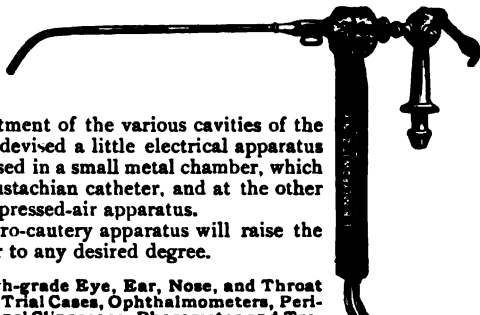
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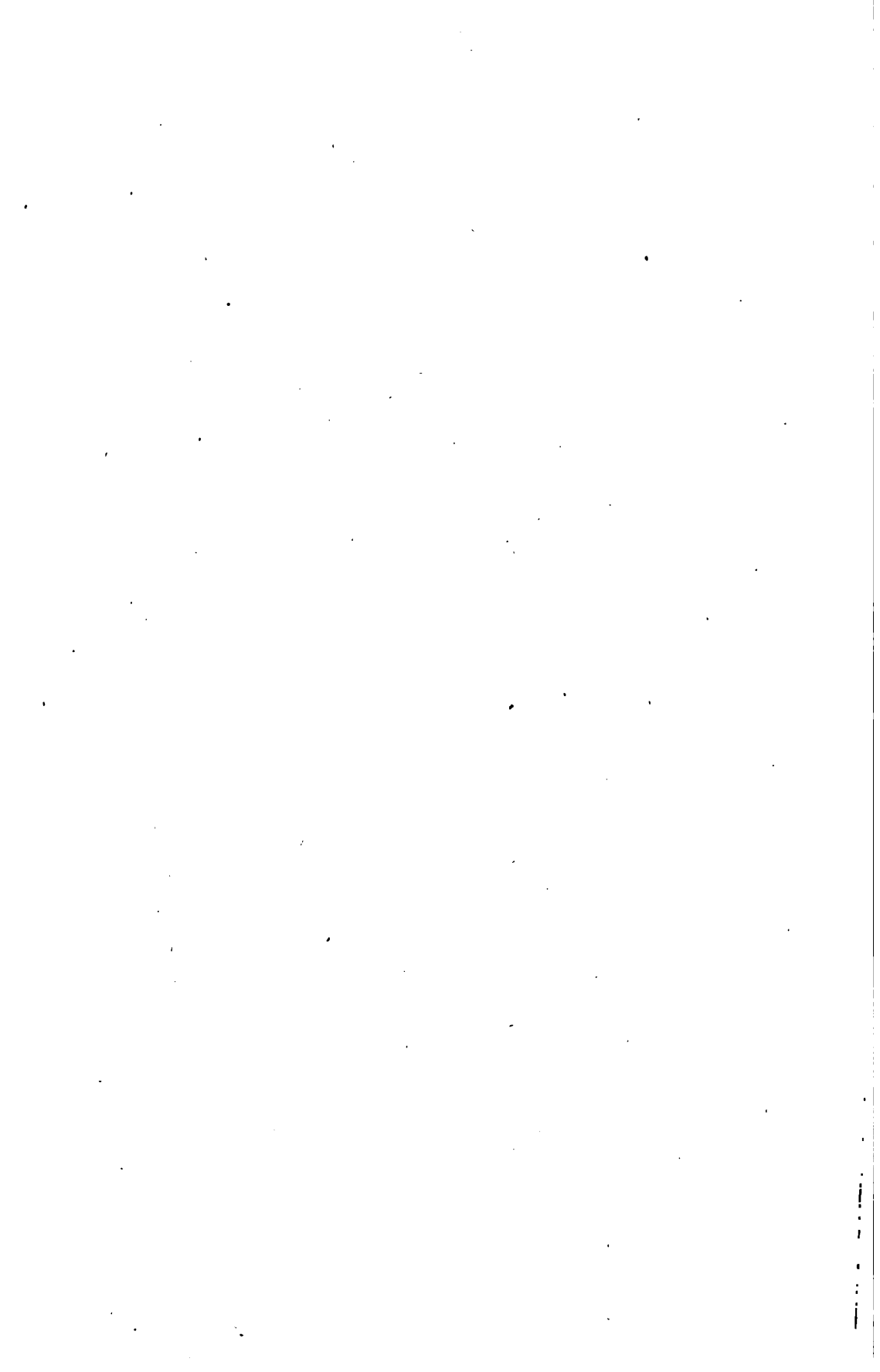
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